The Builder.

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Ambone from the Cathedral, Salerno.—From a Drawing by Mr. Francis D. Bedford ..... *Double-Page Ink-Photo.*
Design for a Window, Trinity College, Oxford.—By Messrs. James Powell & Sons ..... *Single-Page Ink-Photo*
Design for a Window, All Souls' College, Oxford.—By Messrs. James Powell & Sons ..... *Single-Page Ink-Photo*
St. Saviour's Church, Folkestone.—Messrs. Somers Clarke and J. T. Micklethwaite, Architects ..... *Four Single-Page Photo-Litho's.*

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Theatre Architecture at the Vienna Exhibition.

WE have referred more than once to the Musical and Dramatic Exhibition which was opened with great ceremony at Vienna in May last, but which in fact was not complete, nor were any catalogues published, till months after that date. The general scope of the exhibition is of course not within our limits, but the collection of plans of buildings for musical and dramatic entertainments, the latter more particularly, is of considerable interest.

The prefix "International," which now seems to be attached to almost every Continental exhibition, is hardly borne out by the facts; for though Russia, France, Italy, Spain and England have sent a few exhibits, Germany and Austria take absolute precedence throughout; and for a truly international exhibition of music and the drama, and the sciences and trades connected with them, we shall have to wait for the exhibition under the same title which is promised at Paris for next year, and which will probably be more comprehensive in this respect than the essentially Teutonic exhibition at Vienna.

The exhibition is favourably distinguished from many others of the same kind by the rigorous separation between art and science on the one hand and mere trade exhibits on the other. The exhibition has its "Historical Division," divided into musical and dramatic departments, and its *bonâ-fide* trade division. The two are under the same roof, it is true, but they are everywhere kept separate and arranged on a different system, the historical exhibits being arranged as a museum, in small compartments, and the trade exhibits in a large hall, after the manner of a bazaar. Large lettering and showy decoration have their way here, while in the historical division everything is treated with restraint and an entire absence of any sensational announcements. The building in which the exhibition is held is the Prater Rotunda (the main building of the great exhibition of 1878), which has been cleverly adapted to its present use.

Of architecture as represented in the musical department of the exhibition there is not much to be said. Of the many interesting concert-halls to be found on the Continent only a few are represented, and only one fortunately a good one (the "Gewandhaus" at Leipsic, by MM. Gropius and Schmieden), is illustrated by a complete set of drawings. It contains one large concert-room for an audience of 1,700 and an orchestra of 450, and there is a smaller room for chamber concerts, both famous for their excellent acoustic qualities. The open site on which it is placed has facilitated the planning, and it possesses the most satisfactory arrangement for ingress and egress, and the greatest amount of cloak-room space of any music-hall in Germany, while the general architectural effect of the exterior is satisfactory. The other Continental concert-halls shown are the "Musik Vereinshaus" of Vienna, the "Sing-Akademie" of Berlin, and the "Ton-Halle" of Laibach, none of which, however, are well illustrated. Foreign concert-halls seem only to be represented by the Carnegie Music-hall of New York; at least, we did not notice any other. The only other form in which architecture could be represented in connexion with music was in the representation of colleges or schools of music. Of the few buildings of this class exhibited only one has any claim to special notice, the Conservatorium erected some years ago at Leipsic from the designs of Herr Hugo Licht. This is a well-designed practical building, illustrated by a complete set of drawings.

In the dramatic department architecture plays a more prominent part, but the designs are rather scattered, having been arranged along with the other exhibits of the towns to which they belong; though there are two systematically-arranged collections, one of the plans of Baron Hasenauer, the other of those of MM. Fellner and Helmer. As far as architecture is concerned the historical division hardly justifies its name, as few buildings prior to the end of the seventeenth century are to be found. Among the few are a model of a barn as adapted for the use of strolling players, a plaster model of the market-place at Lucerne as adapted for the performance of a Passion Play in 1583, and a model of the Vienna market-place with its typical Theatre. It is only from an examination of the collections of MSS. and prints that one can obtain any information as to the construction and planning of theatres at different dates. Some particulars relating to the prevention of accidents in former days are of interest; and there are accounts of theatre fires in 1412 and 1569, which seem exactly counterparts, in their results, of some modern catastrophes, having been first followed by panic legislation and then by the usual relapse into apathy. Among the MSS. and prints are descriptions and illustrations of several of the large wooden theatres, of which a late example, the Teatro Farnese at Parma, with an auditorium measuring 150 ft. by 97, still exists. In the collections of prints of the eighteenth century a large number of the theatres erected in that age are to be found, together with minute details of construction, and at the same time information is obtainable as to a large number of the theatre fires of the time, sixty of which the eminent engineer Foelsch, of Hamburg, had already spoken of in a pamphlet dated 1878. But the plans and models of the theatres which take up so much space in the dramatic division refer for the most part to buildings of this century; and if the extensive alterations, which often amount to entire reconstruction, be taken into account, it would be more correct to speak of them as dated within the last five decades. There are but few drawings to be found of theatres that no longer exist, and as the average life of a theatre is under twenty-five years, it is not strange to find a comparatively modern collection of drawings illustrating so great a number of the leading theatres of the day.

Commencing with Vienna, the most elaborate set of drawings and models relate to the erection of the new Court or "Hofburg" theatre, built by Baron Hasenauer, and these illustrations have been arranged as a separate collection. There is a most beautifully executed plaster model of the building as a whole, and a similar one, to a larger scale, of the auditorium; then there are a large number of general working drawings

and details of masonry, all in pure outline showing remarkably fine draughtsmanship; also some sketches for bronze fittings, and a number of photographs showing the effect of different parts of the building and illustrating some of the fresco work and sculpture.

Of the other Vienna theatres, all are illustrated, with the exception, strange to say, of the Royal Opera House, one of the most interesting buildings in the Austrian capital, in the auditorium of which there is room for an audience of 3,000 persons. The "Karl" and the "An der Wien" theatres are the two most important of the old "private" theatres of the city, but neither of them can claim notice as architectural monuments. To those who have known these two buildings prior to 1881 they would, however, now serve as excellent examples of the results which can be obtained by systematic legislation, when a dangerous structure has to be converted into a safe one. The only modern play-house which is unsubsidised is the "Deutsches Volkstheater," which was erected by Messrs. Fellner & Helmer, of Vienna, in 1887. This building, which stands on an open site, is considered to be one of the best of the symmetrically-planned theatres on tbe Continent. It can seat an audience of 1,873 (819 on the ground floor, and the rest on two tiers), and can boast of both a pleasing interior and exterior, but it has cost nearly 40,000*l.*

The only other drawings of a modern Viennese theatre which has ceased to exist are those of the unfortunate "Ring" Theatre. This building was erected after plans by E. von Foerster, and was opened in 1874, only to live a short life of seven years. The architect's original drawings are exhibited, including some pleasing water-colours and a large perspective, and on examining these sheets it may be observed that the plan of the building was by no means so unsatisfactory as the fearful calamity which befell it would have led one to expect. It would, perhaps, be well to compare the plan of this Viennese theatre with those of the majority of play-houses situated in countries where "moderate expenditure" is still in vogue, when the safety of the public is concerned. It has often been asked why one nation has more theatre catastrophes than another, although the most unfortunate of the two may have a paternal Government? This difference is not so much due to good luck as to the character of the audience in front of the curtain and of the *employés* at the back. Where the former are not of an excitable temperament, and the latter are cool and well drilled, a catastrophe which would be inevitable with an excitable audience and nervous officials, may be avoided, without any special credit being given to the planning and construction of the building.

The collection of architectural exhibits contributed by Budapest consists mainly of drawings and photographs of the Hungarian National Opera House, which was erected from the design of Ritter von Ibyl, and opened in 1884. This much-admired building only has 1,267 seats in its comparatively large auditorium, each of which has cost about 2,525 florins, as the total expenditure on the structure was 3,200,000 florins. On the Continent, the Budapest Opera House is considered to deserve the careful attention of architects as one of the most interesting examples of modern work in which scientific planning and construction on the one side, and artistic design on the other, may be said to have gone hand-in-hand, and where the result has naturally been satisfactory. It should be noted that the auditorium was in reality planned solely for the accommodation of the Hungarian magnates, and that this fact is the real reason for the small seating capacity; and, secondly, that Herr Ibyl was one of the few theatre architects who could boast of having pleased both the audience and the *employés*.

The valuable collection of designs by MM. Fellner and Helmer gives a fair idea of the number of theatres erected by these eminent Vienna specialists, and includes illustrations of some of the best examples of theatre-architecture in countries outside their own, and above all serves as an excellent inventory of the provincial play-houses in the Austrian Empire, the majority of which are monumental structures, owned by the respective Municipalities. Most of the last-named buildings (the dates of which range between 1868 and 1891) are shown in large working drawings accompanied by strongly-coloured perspectives, and, in some cases, also by models and photographs. There is the Brünn Theatre (which has given its authors great satisfaction and was planned to accommodate an audience of 1,400), then the municipal theatres of Presburg, Salzburg, Reichenberg, Karlsbad, Fiume, Szegedin, Waresdin, and Ternesvar, and further the new "German Theatre" at Prague. These houses have seating capacities varying between 750 and 2,000, and each has some points of special merit; but it should be remembered that these buildings are but minor examples of the Vienna firm's erections when compared with such structures as they have lately put up at Odessa, Zürich, or Berlin.

The Odessa Theatre, a building which holds an audience of 2,500, and in its plan shows the first unquestionably successful scheme of decentralised exits, may at present probably be considered the most elegant play-house in Russia. It eclipses all similar structures in the Russian capital, and is not likely to be classed second until the proposed Imperial Opera House at St. Petersburg has been opened. The drawings for the Czar's new opera-house are hung in the extensive collection representing the "Muscovite Court Theatres Administration," the executive of which has charge of the most elaborate combination of Court play-houses and dramatic schools in the world. Privy Councillor Schroetter, the architect-in-chief to this executive, who is the author of the design, has this time exhibited a more complete set of illustrations than he sent to the Berlin International Art Exhibition. His stage measures 32 mètres by 41 mètres, by 42 mètres, and the auditorium, besides having very ample accommodation for the Royal family and the Court dignitaries, provides seats of most luxurious dimensions for 2,100 visitors. Luxury is the great feature of the design throughout, so that the large auditorium occupies but a small fraction of the cubic contents of the block; the façades, however, are of simple and unostentatious architectural character. Of the theatres at present in the hands of the Muscovite Administration, three at St. Petersburg and one at Moscow have (much to the surprise of those informed of the usages of Russian authorities) been illustrated at the Vienna exhibition. All four were built prior to 1860, and can scarcely be termed good examples of theatre-planning; yet, if the drawings are correct (not always the case in Russia, on account of Police regulations), the houses have apparently been subject to alterations and improvements which tend to make them agreeable and safe, and they have received the most improved and expensive fittings, as far as the lighting, ventilation, and machinery are concerned. These expensive fittings, which for the most part have, however, been introduced in a very desultory fashion, are probably to be seen in their fullest development in the Warsaw Opera House, which was reconstructed at an enormous cost last year.

Whatever criticism the Russian architectural exhibits may call for, it is but fair to acknowledge the pains taken by the organisers of that group to give "architecture" a prominent place in their show. France has not a single architectural drawing at the Vienna Exhibition, although its group of exhibits is an extensive one, and in the space devoted to England not a single contribution of the kind is to be seen. Spain has only sent a coloured section of the "Teatro del Liceo" at Barcelona, and a few plans of the stages of other theatres in that city. Sweden, with its small resources, has at all events shown some neat pen-and-ink drawings, and a sepia perspective of the Opera House at Stockholm, which is being re-constructed by the well-known architect, A. J. Anderberg. Then there is Switzerland, which is, however, only represented by the excellent drawings of the new Zürich Theatre, hung in the "Fellner and Helmer" collection, and Italy by a coloured section of the "Scala" at Milan, and a fairly complete set of illustrations of the "Teatro del Filodramico," which was put up by Signor Giovanni Giachi in the same city. A design by the last-named architect for an Opera House at Buenos Ayres (illustrated by a photograph of the model) can still be noticed as a contribution from the non-German countries, but with the mention of this exhibit the list of "foreign" theatres shown to the visitors of the so-called "International" show must also be closed, as the only other piece of architecture which could claim remark under that heading has not yet been carried out, and, having for its author the late Gottfried Semper, can only be classed with the German exhibits, although intended for Rio Janeiro.

Returning to the exhibits of the various German-speaking countries, those relating to Semper's work at Dresden are among the most valuable. The fine set of black-and-white drawings which illustrate the old Dresden Opera House of 1841 (destroyed by fire twenty-eight years after), and another set illustrating the new Court Theatre, which was opened in 1878, are both remarkable for the beautiful and careful delineation of those parts of the elevations which are curvilinear on plan. The designs of both these buildings, as well as of the one for Rio Janeiro, mentioned just now, and further, the design of the proposed Munich Opera House (which Semper made for the late King Ludwig in 1886), all show the same preference for the curvilinear front, behind which is placed the usual Continental *foger*, and at the same time each of these conceptions includes in some form or other two main staircases flanking the auditorium. The plans illustrate a series of improvements which, if they had been given form as intended in the Munich structure, would probably have brought about a revolution in modern theatre construction, the extent of which can at present only be judged by the effect which a knowledge of the unpublished plans had on Herr Brückwald's Bayreuth "Festspielhaus." The design for the proposed Munich Opera House is, fortunately, at last put before the members of the architectural profession, with an adequate number of illustrations, and the mystery which was somehow connected with this hidden design put an end to. There are not only four of the author's remarkable pen drawings to be seen, but also a very fine model, and these together help to demonstrate Semper's ideas of combining the Grecian Amphitheatre with the modern play-house. The very beautifully-executed model is certainly the *pièce de résistance* of the Munich group, as neither another model showing the historical "Gaertnerplatz" Theatre of the Bavarian capital, nor any of the many designs for a new Royal playhouse conceived by Herr G. Dollmann and Herr Ad. Seder in 1874, can call for much attention. That drawings of the Bayreuth Theatre are not exhibited in the Bavarian group is disappointing, as the publications of that building show the plan only to a very small scale. Oberammergau is represented by some prints descriptive of its historical stage, and further by a plan of the new one which was put up by Herr Lautenschläger in 1890; whilst of other Bavarian towns Augsburg takes the lead with illustrations of its neat little Municipal Theatre, of which Messrs. Fellner and Helmer, of Vienna, were the architects.

Frankfurt-on-the-Main has sent a perspective of her Opera House which was opened in 1880. This architectural picture, which with most effective colouring, shows Lucae's very beautiful structure, is certainly the finest in the Exhibition, not excepting even that which illustrates Schinkel's Court Theatre on the Gendarmen Platz in Berlin, and bears this great artist's signature. That

plans neither of the Berlin Court Theatre nor of the Royal Opera House have been exhibited is not strange, as both these buildings rank among the most dangerous structures in Europe, and would greatly discredit a Government which behaves so despotically where unsubsidised theatres are concerned, whilst itself the owner of the most discreditable theatrical property in its capital. Of late, it is true, thanks to the constant pressure of the Berlin Fire Brigade, large sums of money have been spent on improvements in both blocks, yet these alterations are, as far as the Opera House is concerned, in reality of little or no value.

Drawings of the Victoria Theatre at Berlin, which was pulled down last year, are also shown, and these illustrate one of the most original buildings of its class, which had a summer and a winter auditorium (each for an audience of some 2,000) placed on either side of a central stage. Of modern erections the Lessing Theatre of 1888 (which has been illustrated in the *Builder*) is exhibited, but it is only interesting on account of its plan, to which Messrs. Hennicke and V. d. Hude gave much attention, and for the decoration of the auditorium, which, although exceedingly cold in colouring, has certain merits. Messrs. Fellner and Helmer's "Theater Unter den Linden," which was opened a week or two since, is also represented, but not in such a way as to do justice to Berlin's finest play-house. This building, which is devoted to superior "variety" entertainments, does not stand on an open site, as by some clever strategy the architects had the preliminary design passed through the offices of the local Building Police as an "assembly hall," whilst in reality, with its capacity for 2,500 visitors, its tiers and promenades, this structure is a *bonâ-fide* play-house, and bears no more resemblance to an assembly-hall than the "Empire Theatre" in London. It is, however, in spite of its position, a most satisfactorily planned theatre, and a structure of the highest order. The stucco decorations are indeed somewhat over exuberant, though carefully designed in detail.

Any description of the many exhibits relating to "stage technique" would require much space, especially if the more modern examples were treated of, and hence only a few of the most important illustrations, which are in form of models and drawings attached to the local groups to which they naturally belong, can be noticed. Among the Vienna exhibits of this class is a full working model of the new "Hofburg Theatre" stage, which clearly shows how its engineer,* Herr Bretschneider, considers that hydraulic power can be made use of for stage effects in a more practical way than in the so-called "Asphaleia" system, which was tried in theatres at Budapest and Halle with unsatisfactory results. This model serves as an absolute contrast to one which shows the wooden stage of the great Vienna Opera House, the working of which, although resulting in the attainment of very superior scenic effects, is uncommonly complicated, and (no matter how well superintended by the engineer, Herr Rudolf) is far too dangerous for a building that is so ill-protected as far as risks of fire are concerned. Other examples of such old-fashioned stages are illustrated in a model of the stage of the old "Burg" theatre which has been pulled down, and in a similar model of the Munich "Gaertnerplatz" theatre as it was in 1827. It is interesting to compare these models with the one first named, and then to note the progress made in stage construction during the present century (or rather in the last fifteen years). The "Asphaleia" system, above mentioned, is only illustrated at the Vienna show in drawings of the Budapest Opera House, as financial and other reasons prevented the interesting model of the late Asphaleia Company (which was to be seen in London in 1888) being put into repair for this exhibition. It may be, however, of interest to note that the system as adopted in Budapest has not quite as many advantages as Mr. Emden ascribed to it when giving some details of the scheme before the Society of Arts; in fact, the engineers in charge of both the Hungarian and the Halle stages now tell a very different tale from that given in the pamphlet of the company. There is little doubt that the "Asphaleia" stage, as an extreme contrast to the former wooden ones, has done great service in furthering the new science of stage-engineering, but at the same time some such system as Herr Brettschneider's, which stands between the two extremes, will probably be the one adopted in future theatres. Herr Brandt has exhibited a large working model of a set of "cuts," "sliders," "traps," and hydraulic motors as used with good results in the lately reconstructed stage of the Berlin "Court Theatre," and Herr Lautenschläger, of Bayreuth repute, has, among other drawings, sent a set of illustrations of the proposed reconstruction of the stage of the old Munich Opera House, to which he is engineer-in-chief. Of the stage appurtenances a most varied collection is naturally to be seen in the Trade division of the exhibition, but no novelty of special merit can be found among them. If any one of these exhibits deserves mention, it is the uninflammable pieces of scenery sent by Messrs. Mueller & Schaefer, of Berlin. They show two kinds of fabrics which have been put through systematic trials by the officers of the Berlin Fire Department, and have afterwards been highly recommended by the Prussian Government; but they are unlikely to find a market, on account both of their heavy weight and high price.

The collection of paintings and sculptures in the "Dramatic" department is of considerable interest, and even when the architectural visitor emerges into the grounds of the exhibition he still finds work before him, as many of the provisional erections, in which our Continental neighbours excel, are of great merit. Among these are the reproduction of an old Vienna market-place and a concert-hall of large dimensions, and last, not least, an exhibition theatre, built by Messrs. Fellner & Helmer, and already described in a former number of this journal. It is in this last-named building that the so-called "International" Exhibition can for once fully claim its official description, this theatre being the resort of many foreign companies, as well as of visitors from all parts of the world.

* "Stage engineer" is now a recognised profession in Germany.

ECCLESIASTICAL ART AT THE CHURCH CONGRESS.

EACH year we are informed that special pains have been taken to procure a good exhibition of ecclesiastical art at the church congress, but in this as in former years, the result does not bear out the promises that have been made. The loan exhibition looks very well in the catalogue, but the objects of real interest are not numerous. The "magnificent altar frontal" of the parish church of Folkestone, worked by seven ladies and presented to the church, may be a fine piece of work, but it was not in evidence on the occasion of our visit, the explanation being that it was in use that day in the church; in which case it should hardly have had place in the catalogue.

The fact is that the loan collection is a very heterogeneous affair, and one cannot but be surprised at the varied character of the exhibits which are pressed into the service as representing ecclesiastical art. Among other things we noticed two sporting sketches, some drawings of ships, a bit of Venetian lace, a Norwegian "bride's belt"—a pretty bit of metal-work this last, but in what sense "ecclesiastical"? Apparently it seems enough that an object should be lent by a clergyman to constitute it "ecclesiastical art." We fear visitors will hardly all rest satisfied with this view of the subject.

Among the few things that are of interest is a modern cope presented to and lent by the Dean of Rochester, designed by Mr. Kempe, and worked by the Clewer Sisters. The main surface of the cope is a damask pattern suggesting a little too much the idea of a curtain, but the border is a fine and broad piece of Gothic design, carefully carried out. A set of Armenian priests' vestments, lent by the Rev. A. Saunders Dyer, though simpler, has a finer style and feeling about it, and the priest's hat is a really artistic object, well designed and not obscured in its lines by any redundancy of ornament.

Among the plate which has been lent for the occasion, and which is not a very remarkable collection, some few pieces teach the same lesson of the superior value of simple and well-designed outline. An Elizabethan silver chalice, lent by the Rev. Spencer Philips, with its short stem and spreading bowl of finely-curved outline, is a good example of its class. So is the silver chalice (date 1577) lent by the Rev. E. B. Russell; a cup similarly characterised by good lines, with a little delicately-chased pattern forming a band round the bowl. Another item is a small two-handled silver vessel lent by the Rector of Hythe, and belonging to the church of SS. Mary and Radegund (where?), up to 1850 used as a chalice at the celebration of Holy Communion in the parish church of Postling. The catalogue says—

> From the Hall-marks it appears that the date is 1701-2. being of the "New Sterling" silver, with figure of Britannia and lion's head erased, the maker's mark being AN (William Andrews). The donor is unknown, and it is probably the only one of the kind now remaining in Kent. Archdeacon Lee mentions two similar cups of the "porringer" shape as still existing in the Archdeaconry of Worcester. He considers that they were "probably taken from domestic use," but proceeds to add that "they probably bear more resemblance than any other pattern in shape, if not in size, to the cups of the Early Church, which are described as having two handles or "ears."

The lower portion of the bowl is decorated with a repoussé scallop ornament in spiral lines. It is a thoroughly good bit of metal design of a simple kind. The church plate from St. John's Church Sidcup, lent by the Vicar of Sidcup, has a character of its own; we presume the patten is a modern piece designed to match the flagon and chalice. The communion plate from Kennardington, Kent, lent by the Rector, has also the character of extreme simplicity combined with good lines. One may better appreciate this by comparison with some old plate which has not the same characteristics, such as a silver chalice of Gothic design lent by Messrs. Pairpoint, "dated 1729, but probably of much earlier manufacture." It probably is so, but that does not prevent its lines being clumsy and ill-designed. The Renaissance chalice, "siver-gilt with chased plaques," exhibited by the same donors (or loaners), though of interest, is also a bad piece of design; the foot and stem being out of all proportion to the small size of the bowl, which looks like an afterthought. In such an article as a chalice the cup is the essential portion, the stem should only be developed sufficiently to give a look of firmness and ample support to the bowl. A pair of plated candlesticks curiously designed like a Gothic shaft of quatrefoil section, but with a Classic capital at the top, have distinct character; these are old work of course; no one would venture such a thing now. But the modern chalices, in imitation of the orthodox and admirable Mediæval form, look too much like servile imitation; there is really no design in them; they are practically mere copies.

Of the drawings in the loan collection we have the satisfaction of publishing in this number those which are most to the point, viz.: the set of drawings for St. Saviour's Church, Folkestone, by Mr. Somers Clarke and Mr. Micklethwaite. These are a good set of drawings showing the special treatment of terra-cotta in church architecture, with details as well as perspective views, and are worth study, hence they are naturally hung rather away in a corner, not being among the things that interest the average ticket-holder. We refer the reader to the

lithograph plates in place of further description. Among the other drawings collected are one or two original sketches by Flaxman of sacred subjects, which, slight as they are, always have their interest, and a few scattered sketches of old buildings by various hands. There are one or two elaborate examples of modern illumination, which show certainly a great deal of patience and painstaking, but no feeling for colour; a defect which it must be admitted they have in common with a good many Mediæval illuminations, among which precedents may no doubt be found for the crude colouring exhibited in these modern examples. But there is no merit in copying the defects of Mediæval work.

The small collection of brass rubbings lent by Mr. Franks, though consisting mostly of well-known work, includes two unusual examples of German Renaissance brasses which are of interest. From these we pass into the portion of the collection which is not "Loan," and which might be described most correctly as "Trade." There is some exception to be made in regard to some of the stained-glass work fixed in the vestibule. Mr. E. Frampton's two-light window for St. James's, West Hampstead (figures of Augustine of Hippo and St. Chrysostom), is dignified in design and fine in colour, having that depth and richness of tone in which so much modern stained glass is wanting, and there is a delicate little St. Cecilia panel by the same artist which is very pretty. Most of the rest of the exhibits bear more or less the impress of being, as in one case they are described, "from —— & Co.'s glass works"; as if designs of this kind were to be turned out, like drain-pipes, from a contractor's yard. What would be thought of a picture exhibition in which paintings were described as "from —— & Co.'s painting works"? In cases where the windows are not so described, there is still too much of the appearance of work done to order at so much a figure; and the two or three independent artists of high standing who have devoted themselves to glass design are conspicuous by their absence. But the trade element is absolutely predominant in the large room where exhibits of church furniture and decoration are arranged. There are the usual brass lecterns with mechanical-looking eagles on the top, all on the same pattern, the usual brass candlesticks, brackets, ewers and chalices, nearly the same everywhere, just as they are seen in the trade catalogues, and the usual assiduous attendant on the watch to buttonhole the critic if the latter gives him a chance. To call this ecclesiastical *art* is absurd; it is simply a trade in metal-work produced in stereotyped patterns which have received the *imprimatur* of fashion. Last week we published a simple design for an altar-cross and candlesticks by an artist; they are neither costly nor highly elaborated, but there is an idea in the design, instead of such a mere repetition of stock forms as were ranged along the room at the Folkestone exhibition.

Whether this kind of exhibition satisfies and interests the clergy who attend these congresses we cannot say; but if it does, the fact says little for the artistic taste and training of the clergy. If architects were invited to exhibit designs of churches and church furniture and decoration, and artists were invited to exhibit designs for stained glass, exhibitions of real interest and value might be got up in connexion with the church congresses. As it is, the loan exhibition of ancient work, though containing some items of interest, is but a poor affair, and the rest of the exhibition is simply a church furniture bazaar, in which trade interests alone are concerned. The managers of the exhibition do not appear to know what sort of things to provide or what sort of people to go to for them, in order to secure anything which could be truly called "an exhibition of ecclesiastical art;" and we may intimate that unless all this is altered, we shall not in future think it necessary to take any notice of the Church Congress exhibitions.

NOTES.

JUST as we were going to press came the melancholy news of the death of Lord Tennyson, a loss to the nation which will be felt by educated men of all professions. It belongs more especially to our literary contemporaries to estimate and appreciate the value of his legacy to the literature of this country; but, speaking from the artistic point of view, whatever difference of opinion may exist as to what may be called the philosophic value of his poetry, it must be agreed by all that in one of the highest and most delicate forms of art, that of finish of form and expression in language, he was one of the most perfect artists of whom we have any record.

IT would almost seem that the distinguished witnesses examined on Wednesday before the Water Supply Commission were practically witnesses in the interests of the water companies, at least that would be the conclusion to which many readers would naturally be led on reading the report of the evidence by Mr. Hawksley and Sir F. Bramwell. According to these gentlemen, whose professional eminence is certainly beyond dispute, it would seem that "whatever is, is right" in regard to London water supply, except that we are allowed too much water. Mr. Hawksley makes what must seem to many of us (and evidently did seem to the Chairman) the astounding statement that bad water supply has little or nothing to do with cholera. After this we may certainly take *cum grano* the same witness's assertion that (contrary to a mass of medical testimony) that there are no drawbacks to obtaining water supply from an open river into which all kinds of things may be thrown or drained, even with the most efficient preventive police. Sir F. Bramwell throws out a pleasant prospect of the water companies having powers to further reduce the consumption of water, the demand for which (per head) must inevitably tend to increase rather than diminish in these days. Such a reduction could only be brought about by a system of house-to-house visitation and interference which would be exasperating, and which public feeling would never tolerate. Waste might be efficiently checked by meter supply, no doubt, which we regard as a system worth at least serious consideration, unless (like ancient Rome) we can obtain a supply so liberal that a certain probability of waste may be faced without anxiety. There is water enough in the world if we can only get it to the places where it is most wanted, and get it in a safe way, and not along open rivers. Meantime, we cannot but think that the engineering experts are entirely in the wrong in looking to a diminution of supply per head in the future. More and more water is being used for bath purposes as certain sections of the population grow more healthy and cleanly in their habits, and we want to encourage that tendency and not to check it. The consideration that meter supply might operate to check the proper use, as well as the waste of water, is the one serious objection to that system of house supply. A further witness on Wednesday, Mr. Birch, asserted that in August, 1887, when the companies were abstracting 101,000,000 gallons from the Thames, 175,000,000 *more* might have been taken without injury. There will not be much left of the Thames if it is to be handled in that manner.

WE have received a copy of a paper read read by M. Chas. Lucas at the congress this year of the "Association Littéraire et artistique Internationale," on the subject of "La Propriété Artistique en matière d'Architecture (Signature de l'œuvre architecturale)." M. Lucas appears to confine himself to citing cases in the past in which the architect has been recognised by name as the author of the design of the building, and commemorated by any inscription of his name on the building or the erection of his statue in or near it. The instances from past times which he has collected are of interest, but in regard to the present day the personal credit of the architect for his design may be said to be universally admitted. The difficult point for consideration is, how far the architect has or should have any power to prevent the reproduction of his design in another building and under other superintendence. That is really the only point that requires to be settled, and on that M. Lucas does not offer any definite suggestion.

IT is doubtful if many of the sea-side towns which lay themselves out to attract summer visitors for a few weeks really benefit the local community to any appreciable extent. One thing, at any rate, is certain, that the proprietors of the houses which are let out in rooms to visitors carry on a precarious and often wholly unprofitable business. Whitby is one of the towns which has never gone out of its way to attract visitors, though there is now a small visitors' quarter. To a large number of persons the fact that Whitby retains its old characteristics of a fishing port makes it much more attractive than many brand-new and more pushing places, and in all probability the town is more thoroughly prosperous than others which depend so largely on the patronage of strangers. But Whitby may well remain the same town in general characteristics and yet be largely improved in details. For example, the West Pier, a solid stone structure, formed to act as a breakwater and to facilitate the entrance of fishing vessels, is beyond all comparison finer and more attractive than the trumpery wooden and iron structures which are found at most watering-places. But as a promenade it is spoilt by the inequalities of the flags, which are so uneven as to retain large pools of water twenty-four hours after rain has ceased. From the West Pier and the shore approach a broad road (having the ridiculous name of the Khyber Pass) winds to the West Cliff; at its very commencement it is made hideous by a piece of bare ground, on which stands an unsightly and unsavoury urinal. It ought not to be beyond the enterprise of the Whitby Local Board to erect a small stone structure in keeping with the pier, which would answer the same purpose, and which should contain a retiring-room for women, as well as lavatories and a waiting-room. A little higher up a hideous corner of waste ground should be made sightly by being enclosed with iron fencing and planted with shrubs. It would also be well if measures were taken to do away with the perforated gratings found about 20 yards apart down the centre of the streets, and from which smells worthy of old Cologne attack the nose of the passer-by. Such things are good neither for resident nor visitor. Various other details in which the town requires improvement could easily be mentioned. It is high time that Whitby took a leaf out of its neighbour Scarborough's book, a town which is vigorously and admirably governed. The people of Whitby should rouse their Local Board; without in the slightest degree changing its character, or destroying its old-fashioned charms, it is possible by intelligent administration to make Whitby a pleasanter and a more healthy place. Public spirit alone is needed to do this.

IT was recently stated that a committee was to be formed to collect subscriptions for purchasing, and converting into a Handel museum, the supposed birthplace of the great composer. The house is No. 4, Nicolai Strasse, Halle. Having been lately used as a beer garden, the premises are offered for sale, with the view to the building of a brewery over the site. Handel came to England in 1710. He is known to have lived in London at Burlington House, Piccadilly, for three years—*teste* Sir John Hawkins's Dictionary of Music; and in

Brook-street, Mayfair, in a house that about ten years ago was renumbered 25, and is distinguished by a tablet set in its front by the Society of Arts. The statue which Roubiliac made for Tyers at Vauxhall Gardens, his first work in this country, was, in February, 1889, at Mr. Alfred Littleton's residence at Sydenham, and had belonged to the Sacred Harmonic collection. It represents Handel as Orpheus, with a lyre, and was placed beneath a Doric portico in the Grand South-walk there. This statue is shown in Canaletti's view, 1751, and was included, we think, in the final sale of the Garden's effects in 1859. The monument in Westminster Abbey is also by Roubiliac, being, it is said, his last work. The first Handel Festival was held in the nave on May, 1784; after 1791 they transferred the performances on two or three occasions to St. Margaret's; one has been given at the Chapel Royal, Whitehall, now lent to the Royal United Service Institution. When living in Mayfair, Handel attended service in St. George's, Hanover-square, where he used to sit in his sedan chair placed in the central aisle.

AS will have been seen by a recent advertisement in our columns, the Office of Works have invited tenders for the construction of an additional story at the (old) General Post Office. That building was erected in 1825-29, from the designs of Sir Robert Smirke, R.A., in lieu of the old office in Lombard-street. It stands on the sites of St. Martin's-le-Grand collegiate church, St. Leonard's, Foster-lane (not rebuilt after the Great Fire), the Dark Entry, and, going from north to south, Horseshoe-alley, Round-court, Newrents, Mouldmakers'-rents, Great and Little Dean's-courts, Three Crown-court, and George-street. In June, 1888, that part of St. Leonard's burial-ground which lay next west of the Money-Order Office, and abutted against the northern face of the City wall, was raised, and added to the graveyard of St. Botolph's, Aldersgate. St. Leonard's is a small parish, being fairly co-terminous with the collegiate precincts. A link exists between the church of St. Martin, founded in 1056 by Ingelric, Earl of Essex, and his brother, Girard, and the Tower of London. The Dean of St. Martin's, *temp.* Edward III., was Secretary of the King's Treasury and Keeper of the Jewels in the Tower, and they then gave the name of St. Martin's to the old Brick Tower, wherein the jewels were kept. Another jewel-house was built, in 1842, after the fire; at present the regalia is deposited in Wakefield Tower.

FROM the *Oldham Chronicle* of the 1st inst. we learn that the Sanitary Committee of the Corporation of that Borough are very indignant at some remarks made by the Borough Coroner (Dr. Thomson), and endorsed by the verdict of the jury, at an inquest recently held on the body of a newly-born infant. The jury found that the death of the child was caused by the insanitary condition of the house in which it was born, and,—by implication, at any rate,—they placed the death of the child at the door of the Sanitary Authority. The Chairman of the Sanitary Committee having, at a subsequent meeting of that body, strongly repudiated the conclusions of the Coroner and his jury, and denied that the house in which the death occurred was in an especially insanitary condition, the Coroner (who is a medical man) deemed it to be his duty, in the public interest, to vindicate the proceedings of his court, and he therefore commissioned two engineers conversant with sanitary engineering (Mr. T. S. M'Callum, C.E., and Mr. E. Codling, C.E., both of Manchester) to make a thorough inspection and examination of the house in question, which is situate in No. 1 Court, off John-street. The report of the two gentlemen named contains the following passages:—

"The Corporation officials and the owner of the property were advised of the proposed inspection. The house in question is a 'back-to-back' one. The fireplace of the upper floor was found to be bricked up absolutely air-tight, thus preventing all possibility of through ventilation and the air of the rooms was very stagnant and vitiated; from the foulness of the air it was evident that in some parts of the house the air is never changed. This storing up of a poisonous atmosphere is of itself bad, but any sewer gas finding its way into the house remains there, their being no through current of air to expel it. Back-to-back houses are now a generally recognised source of danger, and the Oldham Corporation should consider whether they ought not to condemn this class of property. The waste-pipe from the sink or slopstone was found to discharge over a gully trap outside. At the time of the inquest this gully was covered over with a flag, so that really it was not 'disconnected' at all. It was simply 'trapped,' which is quite another matter. Experience has frequently proved that under certain conditions of atmosphere, temperature, &c., sewer gas can pass through the seal of an ordinary trap; this is not mere theory, but the fact has been proved over and over again. This being so, it is clear that any sewer gas which might pass through the trap of Howcroft's house would have free access to the rooms, there to be inhaled by the occupants. The lead pipe from the sink to the gully has no trap upon it, so that even if no air from the public sewer passed the trap, the foul odours from the accumulated filth in the trap itself would be sucked into the house. Another strong objection to covering over the gully traps is that it is impossible to clean them. In this same court several of the gullies were found to have become choked in this way, with the result that the sewage matter has been overflowing into the surrounding subsoil. In some cases it was evident that the filth had been for months running into and saturating the ground under the houses; one gully, at least, has been choked for nearly a year. In fact, the ground has really been acting as a cesspool, and, of course, the foul gases are drawn into the houses. There is no option but to condemn the method used by the Corporation for dealing with the waste-pipes. The only safe way for this or any other class of property is to make the lead waste-pipe discharge in the open air over a trapped gully; the lead pipe ought also to be trapped. . . . A day or two before the inspection (and since the inquest) the gullies of the back-to-back houses in this court were ventilated to the open air by gratings; and it is so far satisfactory to note the admission thus made that this is the better method. On applying the smoke test to the drains of the court, numerous defects were found. The rain-pipes have no traps, and they allow foul air to escape at all the joints and at the eaves, close to the doors and windows of some of the houses, one of these pipes being against Howcroft's house. The smoke test demonstrated that these pipes are sources of danger as at present arranged. . . . . At one end of the court (which is the most confined) there are two large gullies, without traps; there is also a sewer ventilating grid near the same point. The result is that enormous quantities of foul air from the sewers (and, of course, any disease germs that may be contained therein) escape at this point. . . . . In testing the drains of the adjoining court, these were found even worse. Some of the gullies there are not even trapped; and in one case the house was filled with smoke in less than two minutes; this proves that by far the larger part of the air supply to that house is sewer air. In another case the waste-pipe is connected direct to the drain without a trap of any kind."

The state of things revealed by this examination shows that the Sanitary Committee of Oldham have plenty of work before them, without wasting time in bandying personalities with the Coroner.

A BOOK on the monumental brasses of Lancashire and Cheshire, by Mr. James L. Thornely, is announced as shortly about to appear. The object will be to give not only illustrations of the brasses, but biographical sketches of the persons commemorated. The brasses which will be illustrated, it is stated, have mostly not been before published.

THE Exhibition at the New Gallery is not a very remarkable or interesting one, and seems to have been prompted rather by the desire to have an exhibition than by the fact of having anything special to exhibit. Some of the best works there, such as Mr. Tadema's "Hadrian," have been exhibited in London not very long since; and though there are a certain number of works worth looking at, there is a large amount of mediocrity. There is however a large decorative painting by Mr. Burne Jones which is worth attention, a design for the mosaic for the Church of St. Paul in Rome; and it is a pleasure to see Mr. Mullins's fine clay sketch for his pediment for the Harris Museum at Preston. It is to be wished English sculptors had more commissions of this kind, especially if they were all carried out as ably as this one.

ARCHITECTURE: AN ART, A SCIENCE, AND A PROFESSION.

BY PROFESSOR T. ROGER SMITH.

THE title of this lecture* bears, as you will most of you recognise, a suggestively close likeness to a phrase which was used as the watchword of a recent newspaper controversy. It is not my wish to attempt to revive that controversy. It is not in my power to say anything about a more serious statement of views in a forthcoming volume which is not yet given to the public. But things have been written and published which, partly perhaps from their indistinctness, have left, or are liable to leave, the impression that there is a necessary difference between architecture as an art and architecture as a profession or as a science. I propose, therefore, this evening simply to state a few obvious truths about the nature of that profession on which you gentlemen are about to embark. In doing so I shall unavoidably have to repeat much that has been said by others. The excuse must simply be that it is necessary to say things which have been said elsewhere, in order to render my statement complete. Here, in this college, where architecture is one of the subjects taught and studied, it appears to me that at the present juncture a plain, definite statement of my views, if not imperatively called for, is at least very timely, and, if I must unavoidably go over ground which has been gone over before, I will at least endeavour to clothe the old truths in my own language.

It is not always advisable in a public address to lay down at starting the precise course which it is intended to take. There is an advantage, at least sometimes, in allowing that course to develop itself, without its being possible quite to anticipate what it will be; but to-night, for clearness' sake, I will at starting define exactly the objects in view. First, then, we will consider what is an art; we will examine the nature of an architect's work, and I will endeavour to show that architecture is justly an art. We will then consider what is a science, and will see in what respects architecture is a science. We will thirdly consider a profession, and I will show you that the serious exercise of the art and science of architecture constitutes a profession. You will, perhaps, by this time see that the drift of the whole lies in the one short word, *and*. That wise fool, Touchstone, says that "there is much virtue in your *if*." At times there is much in your *and*, so I have ventured to substitute for an *or*, which insinuates doubts that I venture to call mistaken, the other conjunction which is meant to imply that there is no doubt at all. There will only be time at the close to allude in the briefest manner to your *preparation* for the exercise of this profession, by the pursuit of such studies as form the occasion of our meeting here this evening, and in other ways; but if I can draw for you a definite picture of what an architect has to do and ought to be, it ought, I think, to be helpful to students who desire to become architects, and, as I hope and believe, good ones.

An art has been defined as "the power of doing something not taught by nature and instinct." Obviously, no natural gift, no skill gained unconsciously and in a natural way is an art. To take a very simple illustration, riding and swimming are often spoken of as arts because we all acquire the power consciously and laboriously—not so walking or running, which may be said to be natural. "Art is not nature." The word *arts* in the plural has an extremely extended significance, and may be used to cover all the kinds of learning and knowledge that are called liberal pursuits. The word art, on the other hand, has often a narrow meaning, and is limited to the sort of skill which is directed towards objects of beauty. Art in this sense is a word which has been of late years on everyone's tongue. More correctly, this sort of art is called fine art, but we usually now refer to painting, sculpture, music, architecture, and the related pursuits a

* Opening Lecture of the Session 1892-3 at University College, London, delivered on Thursday evening October 6.

pre-eminently the arts. This, however, is not strictly accurate. When we talk of an art it may or may not imply the possession and use of learning and knowledge, and it may or may not imply the exercise of trained and cultivated taste and the pursuit of beauty; but it always means a skill that does not come by nature. We talk of the art of the potter, the weaver, the navigator, the engraver, and, rising to a higher plane, we recognise the art of surgery, the art of war, the art of advocacy; but when what is the prime mover is no longer skill, but either learning, experience, money, or passion, the pursuit ceases to be thought of as an art. We do not, for example, talk of the art of a student, or an agriculturist, or a merchant, or a politician, although each of these must develop some skill in the exercise of other powers.

Though there be a distinction between an art as thus described and a fine art demanding cultivated taste as well as skill, the relation between the two is still very intimate; the links, for example, which connect the art of the sculptor with that of the jeweller, or even the potter, are close ones. There must be the same highly-trained manual skill, and the same intimate knowledge of the materials used. The same clear and definite perception of the aim to be attained is needed for success in either. In each of the two industrial arts I have named, pottery and the goldsmith's craft, the production of objects of beauty is also an aim of the artificer, and if in addition the pursuits of the sculptor be of a higher, more arduous, and more intellectual quality, that difference is more in degree than in kind. There is, of course, between most of what are sometimes called the industrial arts, taken as a whole, and the fine arts, a difference which is conspicuous enough, but it is not always recognised that the whole of the arts are connected together to a remarkable degree by the fact that trained skill is in each case indispensable to those who would pursue them, and that there is not often a hard-and-fast boundary line distinguishing the one from the other.

He that pursues an industrial art is called an artisan; he that pursues a fine art is called an artist; but many an artisan is an artist as well. The smith who hammers out a bit of red-hot iron into a horse shoe, and replaces the one your horse has cast, is, perhaps, only an artisan. Yet, while you wait and watch him you are filled with admiration at the deftness, speed, and accuracy with which the work is done. Perhaps the same man can beat out for you a finial of wrought-iron round which he twines the vine leaf or the olive, and into which he infuses grace, beauty, charm. That man is then the artist, but his manual skill is an essential, integral part of his equipment for his art, although the taste, the feeling for beauty, and the knowledge of how to impart beauty to what was an hour ago a dull, inert mass of cold iron, is the highest development of his qualification; useless, however, without the other homelier power, and in some sort, as I take it, rather a development of it than a distinct gift.

Is architecture an art? And, if so, is it a merely industrial art? Is it one of those nobler arts,—like surgery, for example,—which stand out prominently as dignified, and yet may have nothing to do with taste and beauty, or is it a fine art, like the pursuits of the musician or the painter? Architecture obviously does not resemble arts such as are generally called industrial. Architecture is not an industry. It, however, has much in common with what I have described as the nobler arts; it has also much in it of the fine arts. Let us for a moment consider how much, and let us with this object examine the nature of an architect's work.

The architect has to exercise trained skill at every step, and he depends upon that skill for his success. To begin at the beginning, it is not a natural gift which enables him to grasp the requirements in the case of any intended building,—this, which must be done as the first step, is only possible after very considerable experience and training, yet if it be not clear to the architect what the requirements are which he has to provide for, his work is compromised at the start.

Again, the power of grasping the nature of the site which a building is to occupy,—selecting the exact position, and blending or contrasting the intended building with its surroundings, is an acquired skill; in short, an art in itself.

Again, the skill which can rapidly and surely contrive and plan a scheme that will meet the requirements when the latter are clearly understood, and will fit the site, is an acquired aptitude, and one that needs cultivation and constant practice to develop it, and without which the architect is unable to produce a building fit for its purpose.

When the architect proceeds to design his building, he begins by planning it,—that is to say, designing and arranging the shape and size of the floor or floors on which the affairs which the building is for can be most conveniently transacted, together with the walls to enclose them, the openings for light and access, and, in any complicated plan, the communications. While this is being done, however, other considerations must be present to the mind. The shape or shapes given to the building must be such as can receive a suitable roof, and such that out of them shall naturally grow an exterior and interiors with good architectural character. It is impossible to exaggerate the importance of the plan as a factor in the design, and only by trained skill can the architect embrace these various and often conflicting needs at the same time, and combine and contrast, change and recast one part after another till he has achieved that triumph of technical skill, a good plan.

We have said that the appearance of the building has to be borne in mind from the first, and as the planning proceeds, the designing of the exterior and interior must be taken up and proceeded with; and here a skill and a taste bred only of cultivated training, practice, study, effort, and some spark of genius, or, at least, some treasure of talent, is called for. With main forms shapely, well-proportioned, harmonious where a quiet effect is right, or contrasted where brilliancy is needed; with features each in its place, and each itself good; and with mouldings, enrichments, ornaments, and colour, each studied and each characteristic,—the architect must gradually build upon paper a series of elevations and sections which his skill enables him to make, such that if carried out the building shall have beauty, and such dignity, or grace, or other quality as best fits its nature and its site.

Another claim on that skilled capacity which makes up the art of the architect, and one, perhaps, as difficult to comply with as any, is made by the financial question. Rarely has the architect *carte blanche;* rather, as a rule, is he closely limited by a fixed amount to be expended, which may not be adequate to enable his ideas to be carried out. In most cases it is essential to success that strict economy be observed, by which I do not mean mere cheapness, but a vigilant eye to keep out everything in the least superfluous, and a careful adjustment of the entire project to the funds at the architect's disposal. In this respect our work is placed under conditions with which the painter has nothing to do, but which are not dissimilar to those governing the sculptor's work. They press often very heavily on the architect, and yet ability to conform to them is one of the parts of our art most imperatively necessary. To put the case in the fewest words, the architect is spending some one else's money. He is bound to spend it like a careful trustee. He is expected to be able at a very early stage to foresee what the cost of carrying out his design when it has been matured will be; and the success of the undertaking not a little rests upon his success in doing so.

Another peculiarity inseparable from the position of the architect, and one of the difficulties besetting the exercise of his art, is that he has to build through others. He cannot execute with his own hands the works which he designs and produces. An army of carpenters and joiners, masons and bricklayers, are at work erecting the building, each not unlikely to fall into mistakes and mar as well as make. The architect must supply such plans, such specifications, and such supervision that it shall be easier to go right than to go wrong, and that the many hands engaged may work to one end. I quite admit that from one point of view the modern system of management by which in most parts of England one contractor directs many trades diminishes the difficulty which I have described compared with what it was at the beginning of the century; but if it makes it easier to direct a miscellaneous body of operatives, this practice introduces a new and a not less serious possibility of difficulty of a different sort. The interest of the contractor must weigh with him; and may tell adversely if doing the work badly be to his interest, and be not foreign to his principles. In such a case it depends upon vigilance, which may often be eluded, whether cheapness may not take the place of economy in a manner detrimental to the work.

In short, dealing with men, with contractors, foremen, artisans, clerks of works, and last, but not least, with employers, committees, and official persons, is a part of his art in which the architect requires to be skilled. Fortunately for beginners, and indeed for us all, a good routine exists, and scrupulous attention to it will enable a reasonably sagacious man to avoid many of the difficulties; but even to gain a familiarity with that routine is part of the requisite training.

I have yet to allude to one of the most interesting, as well as the most important, branches of an architect's work. I allude to his supervision of his building during its erection. The methods pursued at the present day require a great deal of foresight to be exerted. We build our buildings on paper complete, long before we build them in bricks and mortar, but when the paper work is done the exercise of the architect's skill is only begun. The superintendence of a work consists in part in watching the materials, and the putting of them together to see that the one is sound and the other workmanlike; but it means also watching the architectural quality of the work, as it gradually emerges from the ground and takes shape, in order to see that that shape is what it ought to be, and within limits (to which I will allude directly) to better it. We will select one feature, the mouldings, as an illustration of what should be more or less done for every part. When there are mouldings, either in the exterior or interior, the architect should see a specimen of each important moulding, or group of mouldings, executed in the same material and placed at the same height from the eye as is intended. If he is master of his art he ought to be able to judge whether that of which he sees a specimen will do its work as a factor in the artistic quality of the building, and if it will not to know how to modify it. What it required as to mouldings is required as to every other element of the building, and a skilled and vigilant architect can do much to perfect the quality of his executed work by minute attention to details as they go on.

Beyond this comes the question of improvements. Few minds cease working at any stage short of the end of an undertaking; and the architect or his employer can often see how to modify for the better a building which is in progress. This is sometimes a misfortune, as well as an advantage, and part of the architect's art is to know when not to change, and when he had better change his work as it goes on. Nothing connected with building is more full of risk; and a most unfortunate quality of mind is that fluctuating taste which before a work is well begun desires to change it in important particulars. Over supervision is also a defect, and one part, not an inconsiderable part, of the art of superintending a building is to be able to let well alone.

It may be objected that in this description I have mixed up things which everyone would admit to be *art* with others to which some would desire to give another name. But I reply that every part of what has been just described is essential. If a building is designed and carried out without any regard to the architectural qualities which it ought to have, if it is vulgar, unpleasing, ugly, we all recognise that an essential point is missed; but I maintain that if it is badly planned, or carried out defectively or profusely, the architect has equally missed an essential of success in his art. And let me add that the quality which we are about to consider under the name of science must lie at the root of the art, or the result must be incomplete,—not to say imperfect.

Architecture as a Science.

Science means knowledge. A science is the knowledge possessed by learned men on any one subject. We talk of the science of heat, and we mean all that is known about heat. The science of chemistry similarly means all that is known about chemistry. A good deal of that which is now known consists in the laws that govern phenomena, as well as in bare facts; and under existing circumstances, when the boundaries of knowledge are being extended in every direction, a good deal more of the time of scientific men is spent in

research than in dealing with known and established facts. These two ideas, however, the idea of research and that of the study of natural laws, are what one may call secondary and added notions. The primary and simple meaning of a science is the sum of that which is known and knowable about any great subject.

There are various directions in which the architect has to accumulate knowledge, and various sources which contribute to the science of architecture. The first of these is construction. Skill in contrivance, facility in design, must rest upon and spring out of sound structure. The architect must know out of what materials his building is to be made, and how to deal with them; what is necessary for stability, what for solidity, what for durability; what are the defects or the bad qualities of each material, and what is its special excellence; and how the defects are to be remedied and the good qualities utilised. He requires to know how building is done, and that in various localities and with various arrangements; and he should be abreast of all the improvements of recent years,—the new materials, new modes of manufacture, and new possibilities; but while he is to be aware of what is newest, he must also be master of what long experience has established. In short, *building* is the architect's business, and, unless a knowledge of building which is at once accurate and extensive forms part of his equipment, he will do badly.

This is the more important because all the noble qualities which architecture can impart to mere building grow out of sound construction. Such fine features as the arch, the dome, the vault are only pleasing because they are structurally part of the proper constituents of a building, and proclaim themselves such. When the eye, indeed, once perceives that a feature, even if richly decorated, is not structural, it loses more than half its charm. Few travellers, for example, can have failed to feel keen disappointment when they found out that the gables of many Italian churches were shams, not having any relation to the outline of the wide roof which they conceal; and were there any point from which it were possible to perceive that the exaggerated parapet of St. Paul's suggests to the spectator a storey which does not exist, I think few would fail to resent the means by which a very noble appearance has been obtained.

At the present day the introduction of steel and iron into buildings is the great novelty in construction, and no architect can afford to be unfamiliar with the qualities of these materials, or to be unprepared for the necessity of employing them should it arise. The extensive possibilities opened out by the use of terra-cotta, the various ways in which Portland cement has rendered strong and stable building more easy than before, and the many varieties of tiles obtainable, may be taken as less capital examples of modern methods which must be mastered.

I spoke of various directions in which the science of architecture has been developed. Construction is one, sanitation is another. Not only should the architect be able to design and calculate his own beams and stanchions, he he must also be able to arrange the drains, the water-supply, the heating, lighting, and ventilating of his buildings, and that in a manner such as to be fairly abreast of modern practice in this respect. I do not consider this a less essential branch of the science,—or knowledge,—which an architect must acquire and make use of than construction, and in nothing affecting a building are there so many recent discoveries to record.

A further branch of the knowledge for which I am pleading, and one constantly ignored, deserves mention. I refer to the transmission of sound. How often do we find a fine church in which no one can preach so as to be heard; a court of justice in which the keenest ear can hardly catch half the proceedings; a public hall where no speaker can escape an echo? Now, it is not caprice and chance which occasions these failures, though it soothes our self-esteem for us to say so when we have failed. The truth is that a certain amount of attention to what is known about sound, and of keen observation of buildings already erected, would have rendered the architects and their employers an inestimable service as showing what was likely to lead to failure, and how to avoid it.

The last branches of the science of architecture to which it is necessary to direct your attention is of a different nature to the ones just alluded to. A competent knowledge of some at least of the forms used in architectural design, including under the word forms general masses, features, mouldings, and enrichments, is quite indispensable. When I say a competent knowledge of certain forms, I mean a knowledge so thorough and complete that the architect can use those forms with perfect ease and precision, and knows them as familiarly as he knows the size of a brick or a flue, or as a musician knows the notes of the scale. I said a competent knowledge of *some* of these forms, and probably no man has known or can ever know them all, nor is it necessary. Enough to enable a man to design in one style and to make the detail drawings and profiles for the building is the minimum. How much more is desirable I dare not attempt to say. Possibly the most successful designers have not gone beyond one style; at any rate, the best designs that the world has seen belong to ages when only one style was known and followed in one place. He who would limit himself to one style, however, should at least know every part of that style thoroughly; and, let me add, he will be helped by that knowledge if he study others.

It seems, however, to the last degree desirable at the present day that an architect should have a general knowledge of the past art, at least of Europe, her principal buildings, and the growth and decay of various styles of architectures. Without this he is ignorant of what must often be suggestive and always deeply interesting, and he can hardly be prepared for the miscellaneous demands of the present day.

The sort of knowledge of architectural forms and features to which I refer can hardly be obtained except by measuring and drawing existing buildings themselves. The groundwork of it may be laid by a student while working on another architect's buildings; but, as a rule, a thorough, accurate, serviceable mastery of one style, such as enables an architect to deal with it as the clothing of his architectural ideas is got nowhere and nohow except by definite study of existing work, certainly not from photographs, and only partly from drawings, engravings, or books. A knowledge of the history of the art, on the other hand, is obtainable best in the class-room and the library.

Architecture as a Profession.

We will now try to form an idea of what is meant by a profession; and, as is not infrequently the case, we may perhaps be aided by looking back a little to the days of our forefathers, when life was less complicated than it is now. A hundred and fifty years ago four professions, and, I think I may safely say four only, were generally recognised, though even then one other, to which I will allude directly, might be added. The Services, the Church, the Law, and Medicine are the four. If for a moment we consider what distinguishes these pursuits, we shall have made out the general idea of a profession.

First, in each of them there is the idea of some special personal cultivated skill; in other words, the mastery of an art. Take the Services,—for either of them a man must claim to be skilled in something. It needs a long training to sail a man-of-war, to carry her safely through a storm, to go through a sea-fight with credit and success; nor is it less a feat of trained skill to conduct a campaign, command an army, a regiment, or even a company. In short, seamanship is an art. There is an art of war. The clergyman's position implied,—and to a large extent does so still,—a university education, and a degree, and some mastery of the art of public speaking. That the practice of the Law requires special training and skill, and is indeed an art, is as notorious as that the same is true of Medicine. The first qualification for a profession is then what is meant by the title. The professional man *professes* that he is master of an art; in other words, skilled in a certain pursuit.

Next please note that each of these callings is pursued on behalf of some one else. The soldier and the sailor fight for the other people who make up what we call "their country." The doctor gives advice to his patient or aids him by his surgical skill, and sometimes saves his life, often restores his health. The lawyer conducts his law business for clients and protects their property and interests. The cleric spends his life ministering to the wants of his parish or his diocese.

The respect in which the professions were and are held springs from these two qualifications. A man who can do something difficult and who can accomplish for us what we cannot do for ourselves is more or less looked up to, and the station that he occupies is held to be honourable. Nor is this honour very seriously impaired, if at all, by the third point about a profession, namely, that it is at once the means of living and also the way of life of him who practises it. The idea that a professional man is to be paid is so deeply fixed in people's minds that it is quite customary to use the phrase, "I wish to consult you professionally," in order to convey the meaning, "I want your advice, and am prepared to pay for it." The man who does the same sort of work that a professional man does without making his living by it is discredited by the epithet amateur, which always carries with it a kind of sense of the second-rate, and nowhere more so than when building is spoken of.

It is necessary to add that in many cases the practice of a profession includes more or less of what is known as business, that is to say, of acquaintance with and exercise of the methods by which serious affairs involving property and money, loss and gain, should be conducted. Every pursuit by which a man seeks to make his living requires some business habits and aptitude of him, but in many professions the very nature of the work done calls for business training and talent. Think of the large pecuniary interests which an engineer has to deal with, or an actuary, or a barrister, and you will recognise that many sorts of professional men are bound to be men of business.

Lastly, a profession is the mode of life of the man who practises it, as well as his means of living. If he be not, at least for a period of his life, given up to it, and absorbed in it, and devoted to it, not only is his success in it very problematical, but his claim to any distinction it can confer is doubtful. We have thus arrived at three characteristics of a profession,—that it implies the mastery of an art, and of the knowledge needful for its exercise; that it is exerted on behalf of others; that sometimes it is of the nature of a business, and that it is paid. A [certain precision might, perhaps, be added to our notions by some negative characteristics. It is not commerce, it is not manufacture, it is not agriculture, and it must not be trivial or mean in the objects to which it summons the professional man to devote his life.

Just as, had I gone further back, we might have come upon a period when in Europe there were but two recognised professions, the Church and the Army, so by coming nearer to our own time, with the rapid increase in wealth, population, activity, and knowledge which the present century has witnessed, we find one calling after another conforming to the criterion given above and so added to the list of recognised professions. For example, at least from the days of Reynolds and the establishment of the Royal Academy, a painter has been recognised as a professional man. Since the days of the elder Brunel and Smeaton, the calling of a civil engineer has become a definite profession, and now the list of professions includes literature, education, the fine arts, and not a few of the applications of science, such as the work of the electrician, the consulting chemist, the metallurgist, and many others.

But before the days of the earliest recognition of scientific, or even of purely artistic professions in England, I think we have evidence that the architect was a recognised professional man. All that we know about the career and standing of Inigo Jones, of Sir Christopher Wren, of Sir John Vanbrugh, and their colleagues, seems to show that they must have held a position of the same sort as was accorded to the physician or the highly-placed clergyman of the same date, and certainly that they worked as a professional man does at the present day. So that I am disposed to claim for architecture that in England it was the very earliest profession (next to the famous four) to receive general recognition.

However that may be, architecture as practised, and as you will have to practise it, is a profession with all the marks of one. That it includes the mastery of an art, and the possession of the knowledge necessary to the exercise of that art, I have endeavoured to show. It is exercised on behalf of a client; it is exercised as the pursuit of a lifetime and as a means of

living. It does not relate to mean or unimportant things, and it is not commercial, or agricultural, or manufacturing; but it does require business habits and an aptitude for transacting affairs.

If, then, you are to become architects, you are to embrace architecture as the one chief work of your lives, and to fit yourselves for the practice of architecture you are to master alike the art, the science, and the profession.

And on no other terms can architecture be done, because architecture is building; and building, though no mystery, involves so much that is technical in its artistic, its scientific, and even its business aspect, that in no other way than by becoming a professional architect, and devoting the time and energy which the profession claims, and attaining the skill and acquiring the knowledge which the profession demands, can you hope to execute even an approach to good architectural work.

Architectural Training.

In a lecture which is intended to open a course of instruction in architecture it will not seem out of place if, having arrived at what you gentlemen have to put before you as your aim, I conclude by a few words devoted to showing how you are to attain that aim.

First,—and on this I am disposed to lay more stress than ever—for the practical part of the art, using that phrase to signify chiefly skill and experience, and business aptitude, you must look to the practice of the offices where you work as pupils or assistants. Architecture is a very practical profession, and it is of no use to expect that you can learn how to conduct it by attending classes or reading books, or in any other way than by taking as large a share as you can in the work of some office, and watching keenly and observantly all that goes on there. In your office-life nothing is too insignificant or apparently trivial to be unworthy your notice. At the same time, your wise course is to do your very utmost to qualify yourselves for the more difficult parts of the work. Always welcome a difficulty. If a hard master it is an invaluable one.

Beyond that phase of the art which you learn in the way I have just indicated there is the science of architecture, of which you can learn little in an office, but much in classes and from books.

And in acquiring the science always, from the first, give prominence to that side of it which has to do with architecture as a fine art. The nature of materials and how to use them is a matter more easily mastered than the nature of architectural forms and features, mouldings and enrichments, and if you begin with construction and neglect the other sorts of knowledge, you will find them less easy to take to than if you go the other way to work.

Begin by learning to draw, and to draw well, and then exercise yourselves continuously in drawing architectural objects and other objects partly from other drawings, but as far as possible from existing buildings and from plaster-casts, and you will gradually acquire that sort of knowledge and that sort of skill which are at once the most valuable and the most difficult.

Early try to get a mastery of perspective, and keep up and extend any skill you have in drawing the figure and in landscape.

In addition to this knowledge of forms, which is largely to be learned by the use of the pencil, gain a knowledge of construction, of materials, and putting them together, and of all the scientific and practical subjects which bear upon your future career. In this, of course, classes, lectures, and books are indispensable, but a good deal can be learned by an observant man from the working and other drawings in progress in the office where he is employed, and more, and that of the most valuable description, on the scaffold or in the workshop.

Every student should learn also the history of architecture, without a knowledge of which, indeed, it is all but impossible to understand the forms and meaning of any important part of a building.

As knowledge grows, and students become familiar with the way in which buildings are shown geometrically, it is very desirable for them to try their hand at designing, *i.e.*, putting together the materials of an artistic and practical sort which they have begun to accumulate in their memory. In this way the rudiments of the highest part of architectural art, namely, architectural fine art, are begun to be mastered.

The most valuable school for the study of this, the highest part of architecture, is, beyond doubt, the study of existing buildings. Observing them is of some use, sketching them is of more use; most useful is measuring and carefully drawing out good examples, and to this pursuit various shorter periods of Continental travel and study may be usefully allotted, but certainly one good long tour. This is what all should aim at accomplishing before settling down to begin practice, and this, more than anything, gives a student the chance of becoming an artist.

I take it for granted that any student now seriously proposing to become an architect will set before him the passing of the Examinations established by the Institute as part of the career which, as a beginner, he must look forward to. Remember that these and the certificates they earn, like all examinations and honorary distinctions, are valuable as means—not as ends. They set before you objects of study. They supply a means of testing what progress you have made, and they supply what is often invaluable, a stimulus; but the object of a student of architecture is to make himself an architect, and that object is not necessarily attained when the first, or the second, or the final examination is passed; nor it is wise to regulate your studies only by the question of whether they will or will not count for marks at Conduit-street. There is not much that will help a real architect in his work which will not also help a candidate in the examination, and perhaps the converse might have been even more strongly put, namely, that there is nothing which will assist a candidate in the examination that will not be of service to him as an architect, were there no such thing as a crammer. Knowledge that is crammed is like food that is bolted, it is not assimilated, not digested, and so cannot nourish.

It may not be out of place to point out shortly what subjects can be studied in this college. The history of architecture looked at as a fine art forms the subject of one of my two principal courses. I endeavour to demonstrate how one style grew out of another and matured and decayed, and in what the architectural quality of each consisted. I also attempt a criticism of individual buildings, and a somewhat close investigation into the details of some of those styles of architecture which are most highly developed. Materials and construction form the subject of another course of my lectures, and here each important building material is taken up in turn, its qualities, excellences, and defects are set forth, and the use to be made of it in building is explained. A third course, on the practice of architecture as a profession, touches on the routine of building operations, the laws relating to building, and similar matters as to which an architect should be informed. I have much pleasure in saying in addition that we have now established, in this College, at the expense of the Carpenters' Company, two evening classes for drawing—one for architectural drawing, and the other for the drawing of building construction, and these, I hope as they become generally known; will be of great service to many students, for they are calculated both to afford knowledge and to give practice in draughtsmanship. They are under the direct care of two extremely competent gentlemen, as well as under my own general supervision, and the City Company, which has established them, has enabled us to make the fees extremely moderate. These classes all meet at hours calculated to suit the convenience of students engaged in offices during the day.

Various classes in this College also afford opportunities for the study of many subjects which it is well for an architect to know, such as geometry, physics, chemistry, geology, the technology of building materials, sanitary science, land surveying, and, in another branch, architectural ornament.

These, however, are not classes which meet at hours convenient for students who are engaged during the day. For those who have the entire command of their time a very complete curriculum, that might be taken as preparatory to becoming an architect's pupil, has been arranged at an inclusive fee.

I may add, for the information of students who are uncertain what classes to attend, that it is open to them to attend any class for one or two lectures as visitors, and to consult with me after either lecture as to what class to take.

To those who may be coming here this session to study for the profession of architecture I promise a hearty welcome, and that no pains shall be spared to make their work instructive, and, let me add, interesting to them; and not only to those students, but to all who are preparing for the practice of the profession whose nature and scope I have tried to set forth, I cordially offer sincere congratuations, because the pursuit in which they are about to engage, if laborious and often trying, is certainly fit to occupy the best efforts of the best men.

It is no mean, or slight, or even passing aim that the architect pursues. His works, though by the side of natural objects they may seem very transitory, are yet, as man's work goes, enduring, stable, solid. To build well, fittingly, and nobly is an occupation worthy of the best energies of a capable man. Fortune is not easily attained by the architect; and the very highest rewards of professional life, equal for example to the Bench or the Cabinet, are not attainable by him, or, indeed, by the followers of any pursuit which is non-political. But short of all this, architecture places within an able man's reach enough to justify any reasonable ambition. There is in it scope for the exercise of very varied powers exerted for the attainment of objects more useful to mankind than those which the bulk of them follow.

The work to be done, and the duties to be discharged, in the successful conduct and completion of a building operation, from its first inception to the final settlement, are sufficiently arduous and varied; and the man who has honourably and satisfactorily carried out such operations for a period of years, and has been able (as I hope each one of you will be able) to give to his buildings some of those qualities which raise them to the higher plane of architectural fine-art will not have lived in vain.

Those whose aim is the highest part of the architects' art will find the field is singularly open to genius and even talent. In no other profession are there such opportunities offered to young men of real power as the system of open competition for public buildings places within the reach of architects. However beset that system may be with drawbacks of various kinds, it does open a door to success, the like of which does not, so far as I know, exist in any other calling; and in other ways opportunities do not fail to present themselves to most men who can afford to wait for them. It is the ability and the energy to grasp them which are oftenest wanting. Believe me, in so rich a country as England if any one of you proves to be another Wren, another Pugin, or another Barry, it will be strange, indeed, if he has not ample scope, and the chance of adding to the number of those works of art which contribute more than aught else to the dignity of a nation. The most justly prized of all the works of art in our country are our cathedrals, with their splendid conception, daring construction, overpowering dignity, and lovely grace; and to build a cathedral seems a chance past hoping for. Yet the four men in our own century best able to vie with the architects of old have had the opportunity at Hamburg, at Cork, at Dublin, and at Truro of distinguishing themselves as architects of cathedrals.

I do not wish to conceal from you that the profession is laborious, and that its great prizes fall to very few; but I maintain that its more modest rewards are within the reach of many; and if one among you really becomes equal to the performance of some special feat of architecture, I feel sure that—if not the nineteenth—the coming twentieth century will afford him the occasion for distinguishing himself, and adding to the adornment of his country.

New Church, Bradford. — The dedication-stone of the new church for Bradford, to be called St. Clement's, was laid on the 24th ult. The site is at the junction of Gilpin-street and Barkerend-road. The building will be Perpendicular Gothic in style. The principal entrances will be at the west end, and the total length of the edifice extending along Barkerend-road will be 150 ft., and the total breadth 74 ft. At the north-west corner will be a turret with spire, the height being 83 ft. The height from floor-line to roof will be 50 ft. The roof will be open-timbered and decorated. The altar is to be of marble, and a sedilia and piscina will be provided. The chancel will be 44 ft. long and 22 ft. wide, and there will be an east window of five lights. All the pillars of the aisle will be of red stone from Cumberland. The church will have open seats, and will provide accommodation for 600 or 700. Messrs. Wheeler Bros., of Reading, Berkshire, are the contractors, and the architect is Mr. E. P. Warren, of Westminster.

ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS:

MEETING IN BELFAST.

A MEETING of the members of the Incorporated Association of Municipal and County Engineers was held at Belfast on Friday and Saturday, September 23 and 24. This is the second meeting held by the Association in Ireland, and like the Dublin meeting of the previous year, the Belfast gathering was a pronounced success, viewed either from a professional or social standpoint. Amongst the members attending the meeting were Mr. J. Cartwright, of Bury, President; Messrs. T. de Courcy Meade, Hornsey; J. T. Eayrs, West Bromwich; J. C. Bretland, Belfast; A. M. Fowler, Manchester; W. G. Scoones, Maidstone; R. H. Dorman, Armagh; S. Stead, Harrogate; J. T. Hawkins, Somerton; W. H. Savage, East Ham; A. Greenwood, Todmorden; J. B. McCallum, Blackburn; J. H. Brett, Antrim; R. N. Somerville, Cavan; H. Shellington, Lurgan; R. B. Sanders, King's County; P. Dodds, Southend-on-Sea; M. S. Gaulter, Fleetwood; W. H. Hopkinson, Keighley; H. P. Cowan, County Down; J. P. Spencer, Tynemouth; J. Perry, Galway; W. J. Robinson, Londonderry; L. L. Macassey, Belfast; C. C. Smith, Dalton-in-Furness; F. Cartwright, jun., Bury; T. Cole, Westminster (Secretary), &c. The visitors included the Mayor of Bury (Councillor Ascroft); Alderman Dr. Parks, Bury; Dr. Manly, J.P., West Bromwich; and others.

The members attending the meeting assembled at the Great Northern Railway Station on Friday morning, where they were met by Mr. R. Corry, Chairman of the Waterworks Commissioners, and Mr. J. C. Bretland, City Surveyor, and were conveyed in cars to the extensive filter-beds and reservoir of the Belfast Waterworks at Stoneyford. On arrival at the filter-beds, which are capable of filtering 3,500,000 gallons of water daily, the works were thoroughly examined. There are three extensive filter-beds, which are so constructed that two of the three beds are sufficient to properly filter the water passing through the filtering medium, thus keeping one in reserve for cleansing. This has been found in working to be a most useful reserve, as the water is peaty, and would otherwise soon choke up the beds. The filtering medium has a depth of 5 ft. 6 in., and consists of stone, gravel, and a top layer of fine sea-sand; 500 gallons of water per square yard are passed through the filters every twenty-four hours. The cleansing of the sand is most thorough, and was generally commended.

From the filter-beds the party drove to the supply-reservoir at Stoneyford, where they were entertained at luncheon by the Waterworks Commissioners, Mr. Corry presiding. After luncheon, the Chairman proposed "Success to the Association of Municipal and County Engineers." He said he was very much pleased indeed to have the opportunity of bidding them a hearty welcome to Belfast, and he hoped their visit to the waterworks might be useful to some of the engineers attending the meeting. He knew they had in Belfast taken the opportunity of visiting other places where works had been in course of construction, and they had returned home carrying with them information that was useful to the community they served. He thought there were no more responsible body of men in the kingdom than the engineers connected with the various Municipal Corporations, for to a great extent the health of the community was in their hands. A great deal depended upon their skill to counteract the possibility of epidemics occurring. Mr. Cartwright, President of the Association, in responding, said he desired, on behalf of the Association, to thank Mr. Corry, not only for the hospitality they had received, but for the very kind words he had spoken as to the responsibilities devolving upon Municipal Engineers. He was personally pleased that the experience and knowledge of Municipal Engineers were extending, and he believed that experience and knowledge would fit them to cope with any epidemic if occasion should unfortunately arise.

After an inspection of the extensive reservoir at Stoneyford the party returned by cars to Belfast. In the evening the members attending the meeting dined together at Thompson's Restaurant, Donegal-place, and were subsequently received by the Lord Mayor (Sir T. Dixon) at a conversazione given in the Queen's College, at which 600 guests were present.

The proceedings of the meeting of the Association were resumed in the Council-chamber of the Municipal Buildings on Saturday morning, September 24, under the presidency of Mr. J. Cartwright, C.E., of Bury.

On the proposition of Mr. J. C. Bretland, C.E., of Belfast, seconded by Mr. R. N. Somerville, of County Cavan, Mr. R. H. Dorman, County Surveyor of Armagh, was re-elected Honorary Secretary of the Association for Ireland.

Mr. J. C. Bretland, C.E., City Surveyor of Belfast, then read a paper on

The Progress of Municipal Affairs in Belfast.

He said: It has been suggested that some information regarding the progress of municipal affairs in this city would be an appropriate contribution from the writer on the present occasion, and, gauging the interest taken on the part of this Association by the number of its members present to-day, the author ventures to hope that some information on this subject would be acceptable. The following statistics show the unusually rapid rate at which Belfast has progressed for many years back and the great strain that has been placed on those in authority in the city to keep pace with its development. Belfast comprises an area of 6,805 acres, 4,322 being in the County Antrim, and 1,670 in the County Down, 813 acres being tideway. The municipal rates collected during the year 1890 amounted to about 137,119*l.*, and during the year 1891 about 144,363*l.* The number of buildings situate within the city during the last three decades were as follows:—1861, 18 375; 1871, 31,645; 1881, 43,790; 1891, 57,540.

The number of new streets laid out, paved, and sewered at the cost of the owners of property since the passing of the Belfast Improvement Act of 1865, is 1,618.

The following shows statistics of population included in the municipal area from the census returns:—1831, 48,224; 1841, 75,308; 1851, 100 301; 1861, 120,777; 1871, 174,412; 1881, 208,122; 1891, 255,235.

The valuation of the city in 1892 was 738,583*l.*

The indebtedness of the Corporatian of Belfast at the present time is 985,544*l.*

The following table shows the death-rate of Belfast during the last few years:—1881, 23·6; 1882, 25·1; 1883, 25·8; 1884, 22·7; 1885, 27·1; 1886, 22·5; 1887, 24·3; 1888, 23·7; 1889, 23·6; 1890, 26·7; 1891, 25·5.

It is to be regretted that this table does not show favourably in comparison with some other large cities. The fact that the greater portion of Belfast is barely above high-water level, and the peculiar nature of the work performed in heated and humid factories by thousands of workers, has no doubt a tendency to keep the death-rate somewhat high. It is confidently hoped and believed, however, that the sanitary improvements now being carried out by the Corporation may soon bring in their wake a reduction of mortality.

Queen's Bridge.—In 1885 the matter of the widening of Queen's Bridge, the chief connecting link between the Counties of Antrim and Down, was forced by the great increase of traffic on the consideration of the Council with a view to their exercising the powers already acquired for widening the bridge. The original bridge was erected about fifty years ago, and is a granite structure of five segmental arches, its width originally being 42 ft. The author proposed to widen the bridge to 64 ft., and this was accomplished by means of overhanging footways supported by cantilevers, leaving the width of the original bridge for vehicular traffic.

Owing to the original structure being nearly all occupied for carriage traffic, the curb for the footways is formed of a vertical cast-iron web, with a bottom flange resting on a new course of granite work. The castings forming this curb are in lengths of about 12 ft. each, a tie-rod across the old bridge at a level near the bottom flange being placed at each joint so as to connect the casting on the one side of the carriageway with that on the other, in order to counteract outward lateral pressure caused by vehicular traffic. The original capping of cutwaters was removed and gave place to massive clustered granite columns with moulded bases and moulded and carved capitals, each column being set on a new granite base. The columns carry the projecting cross girders before mentioned for a portion of their exposed length and thus considerably lessen the length otherwise unsupported. The upper portion of four projecting abutment piers was removed, and the remaining portion was covered with a moulded and carved course of granite corresponding in design with the capitals of the columns and forming a like support for the cross girders there occurring. The four terminal piers of the bridge were corbelled out about a foot, and furnished with a granite pedestal to receive the shore ends of main girders. The new parapet is surmounted on each side at intervals with ornamental lamps.

Considerable obstruction to public traffic, of course, necessarily ensued during the progress of the work, but two lines of carriage traffic and one line of footway were maintained throughout. This was accomplished by setting the cross girders in halves, joined together afterwards. The cost of the work was about 13,000*l.*

The New Albert Bridge.—The new Albert Bridge, spanning the river Lagan at East Bridge-street, was opened for traffic in August, 1890.

The old Albert Bridge, 30 ft. in width, built about sixty years ago, suddenly collapsed on the night of September 15, 1886, unfortunately causing the death of a watchman placed there to guard the traffic off what were considered certain unsafe portions of the structure. Means were promptly taken to connect the traffic between the two counties, and the Corporation, with commendable dispatch, and with facilities kindly granted by the Harbour Commissioners, ordered the construction of a pontoon bridge, which served admirably until a temporary timber bridge for vehicular as well as for pedestrian traffic, costing about 3,500*l.*, was erected. Meanwhile a Bill was promoted for the erection of a permanent structure, and this having been passed in the following year, the work was entrusted to Mr. James Henry, contractor, of Belfast, who in his turn placed the construction of the ironwork required in the hands of Messrs. Handyside, of Derby, the amount of the contract being upwards of 36,000*l.* After operations had been some time commenced the memorial stone was laid in the month of May, 1889, by his late lamented Royal Highness the Duke of Clarence and Avondale.

The new bridge is 60 ft. wide, and this width is certainly sufficient for present demands and will also amply meet future requirements. The bridge itself consists of three arches, each 85 ft. span, combining a minimum height of roadway with a maximum height of headway above the river and securing improved accommodation for the public traffic. Among the prominent considerations in connexion with the design were economy in cost and rapidity of construction. After the removal of those portions of the old bridge which were in the way and the deepening of the river bed, the foundations of the new piers and abutments were laid by the aid of coffer dams of single baulk timbers grooved and tongued, this method being considered more economical than the adoption of ordinary puddle dams. The foundations being laid upon the solid rock, injurious tendencies connected with the scour of the river are averted. The abutments and piers having been raised to the proper height, the grooved and tongued piles were cut off at a level of about 12 ft. below low-water mark, the lower portions being left to form a permanent guard to the foundations. The foundations up to this height are formed of concrete, upon which have been built large square granite blocks from the Dalbeattie quarries of the Messrs. Newall, and brickwork backing with concrete, the whole forming the abutments and piers to support the arching.

The bed from which the iron arches spring consists of a heavy moulded course of granite. Over this are placed cast-iron skew-backs to receive the cast-iron arching, the skew-backs being bolted down to the bottom of the granite work in order to secure their rigidity. The main supports of the roadway and the footways are of cast-iron arched ribs, eleven in each span, and each rib consists of five castings bolted together and having their joints accurately planed. These arched ribs form a solid platform, on which is constructed the superincumbent iron and surface work.

Where resting on the skew-backs the arched ribs are provided with cast-iron pivots accurately planed, which are adjusted by means of steel wedges, permanently introduced, securing

an equal bearing of the ribs at all parts of the skew-backs and thus avoiding any unequal strain. On the cast-iron arching there is a complicated series of wrought-iron uprights and cross braces bearing up the longitudinal girders, which in their turn receive the flooring of the bridge. This flooring consists of wrought-iron corrugated plates $\frac{3}{8}$ in. thick covering the whole extent, and upon it is placed a layer of concrete which receives the granite set pavement and the asphalte footways which form the surface. At both sides of the bridge the external faces of the iron arching are faced with ornamental cast-iron work, the covering of the arched ribs being fluted, and the spandrels of ornamental foliated design including shields which bear the city arms. The parapet also is of ornamental cast-iron of open and pierced pattern, surmounted by a moulded cast-iron handrail. Above springing level the faces of the piers and abutments are built with granite work of the finest workmanship, extending to a level somewhat above the top of the parapet. Above springing level the faces of the abutments and piers where covered by the arching and other ironwork are of brickwork, the piers being built in hollow chambers in the usual manner. The approaches to the bridge are formed by four curved wing walls of finely worked granite blocks, and these walls where below the road-surface are backed by concrete, the whole resting on a concrete foundation, which latter, upon the County Antrim side, rests upon piles.

The estimates were ample enough to enable the Corporation to construct three granite approach quay walls adjoining the bridge approaches, each about 100 ft. in length, which not only form a permanent portion of the river improvement, but set off the appearance of the bridge. The actual expenditure on the bridge and its approaches, including the three quay walls above alluded to, may be taken at about 45,000*l.*

The Sewage.—Hitherto the sewage of Belfast has been discharged into the River Lagan, causing a constantly-increasing pollution of that river which in latter years has become all but intolerable.

So long ago as 1866, the late Borough Surveyor presented an exhaustive report recommending the intercepting of all the sewage of the borough and its discharge into the Belfast Lough at a remote place from the town, and the late Sir Joseph Bazalgette reported favourably upon this proposal.

The Corporation in 1870 promoted a Bill for carrying out this recommendation, including also proposals to reclaim a large portion of the tidal lands of the Lough with a view to using the land thus reclaimed for irrigation. The works embraced by this Bill were of such a costly nature that the Bill collapsed even before going into Committee, but the question was again revived in 1885, when the author reported to the Corporation upon an amended scheme of sewage interception, which after having been also reported on favourably by the late Sir Joseph Bazalgette was adopted generally by the Council, but not until 1887 was the Belfast Main Drainage Act finally passed.

For more than three years the author has been busily engaged in constructing the various works embraced by this Act of Parliament. The total cost is estimated at about 300,000*l.*, and up to the present time about half this amount has been expended.

The scheme includes the interception of all the sewage now discharging into the river on both its sides, and the connexion of the County Down side of the city with the County Antrim side by means of a "syphon" under the river. The main trunk sewers are twofold, one a high-level section and the other a low-level section. The low-level section is pumped into the high level at Duncrue-street in the northern portion of the city, and then flows down to a covered storage reservoir, which is designed to hold the accumulating sewage except between the time of high water and half ebb (thus securing the advantage of a strong ebb current carrying down the sewage towards the open sea), when it is discharged through a covered timber sewer built on the flats of Belfast Lough down to the deep water of Whitehouse Roads. This latter sewer is built altogether under low-water level, and has been a most difficult work to construct. A portion of the sewage flowing to the reservoir will discharge into the latter by gravitation, but the remaining portion requires to be pumped into it at an adjoining auxiliary pumping-station.

Of these works the following are completed or now in progress:—The reclamation of about 25 acres of land from the tide to provide a site for outfall works, the construction of the timber sewer one mile in length, the covered reservoir, the outfall sewer, the high-level sewer, a portion of the low-level sewer, the Duncrue-street pumping-station, and the auxiliary pumping-station at the reservoir. The latter work and its accessories are being constructed on the 25 acre enclosure before alluded to.

The remaining contracts for the continuation of the low-level drainage and the crossing of the River Lagan, together with various branches to complete the system of interception, will follow rapidly on.

The main drainage works embrace many most difficult problems involving special and costly adaptations to the peculiarities in connexion with the strata and the physical contour of the city. As an illustration of this it may be observed that the storage reservoir and its accessories are erected entirely on a piled foundation in which about 7,000 piles have been driven.

It should also be observed that although the present intention of the Corporation is to discharge during a certain tidal term crude sewage into the sea, the Main Drainage Act provides for the reclamation of more ground from the Lough in view of the possible contingency of some system being thought advisable for precipitation or other mode of purification; but it is hoped that, as in the case of Portsmouth, the necessity for any attempt to treat the Belfast sewage by any special process may be indefinitely postponed, unless indeed some method can be devised whereby the Corporation could deal with the matter without serious cost to the ratepayers.

Markets, Parks, &c.—Belfast is possessed of extensive market accommodation, and a short time ago the author constructed the first and second sections of a covered market which, when fully extended to its proposed limits, will form a leading feature in the corporate property.

For many years back the Corporation have expended large sums of money in removing, under special Parliamentary powers, old and dilapidated property in various unsanitary and congested districts, thus transposing these localities into handsome streets and open spaces fringed with valuable new buildings.

Amongst such street improvements Royal-avenue takes the foremost rank. The formation of this thoroughfare 80 ft. in width, connecting the northern and southern portions of the city, has, no doubt, proved one of the most successful street improvements accomplished by any municipality in the United Kingdom.

Other important improvements of this nature are about to be immediately undertaken by the Corporation.

Belfast possesses several parks and recreation grounds, which have been laid out in recent years by the Corporation, to a considerable extent under the direction of the author.

Ormeau Park, 100 acres in extent, was the first thus laid out, followed by the Falls Park, Alexandra Park, Woodvale Park, and, lastly, Dunville Park, the generous gift to the city by Mr. R. G. Dunville.

Public baths have been erected by the Corporation in three districts, and it is intended shortly to erect two other institutions of this class.

Corporation Gasworks.—The gasworks were purchased by the Corporation in 1874. Since this time the gas has been reduced by the Corporation from 4s. 6d. to 2s. 9d. per 1,000 cubic feet. The profits have been yearly very large, and amounted last year to 34,462*l.* At the present time there is urgent need for large extensions of these works, and the Corporation are at present engaged in selecting a site for additional works.

Waterworks.—The water supply for the city and neighbourhood is under the control of the Belfast City and District Water Commissioners, a separate corporation, the members of which are elected by the ratepayers. Large sums of money have been expended in grappling with the constantly increasing demand for water, and at the present time a scheme is being prepared for obtaining an Act of Parliament next session for an additional supply from the neighbourhood of the Mourne Mountains, some thirty miles or so distant.

Mr. J. P. Spencer (Newcastle-on-Tyne) proposed a vote of thanks to Mr. Bretland for his paper. He said the City of Belfast had caused him infinite surprise and pleasure at the immense advantages which it enjoyed from the industry and perseverance of its people. The members attending the meeting had had an opportunity of inspecting the very excellent detailed drawing of the various public works carried out in Belfast, and having looked over them, he wished to congratulate Mr. Bretland on the admirable way in which they were prepared, and to add that they required no explanation, for an expert had only to look at them to judge what the work would be when carried out and finished.

Mr. J. Perry (Galway) seconded the vote of thanks. Having highly commended the public spirit and enterprise of Belfast in many directions, Mr. Perry urged that the city was much behind in the matter of electric lighting. He was one of the proprietors of an electric lighting works at Galway, which was selling electricity at 3d. per unit for motor work and 5d. per unit for lighting purposes. He commended the example of Galway in electric lighting as worthy the imitation of Belfast.

Mr. A. M. Fowler (Manchester) thought it would be well if Mr. Bretland could show that the street improvements effected in Belfast had been a financial success, because there were many towns in England contemplating street improvements. He knew that in Leeds such improvements had been a financial success. When Boar-lane, in Leeds, was 24 ft. wide, the highest price obtained for land was 3*l.* per yard, but after it had been widened to 60 ft. land sold for as much as 60*l.* per yard. It was thought at the time that the rates would be very much increased by the making of this improvement, but they were not increased a single penny. This was due to the Corporation taking more land than they required for the street, and selling the surplus land at a profit, and the increased value of the rates on the new property. This was very important, as many towns were frightened from undertaking necessary street improvement from fear of the increased rates.

Mr. T. de Courcy Meade (Hornsey) said he regarded the timber outfall sewer as one of the most interesting points of the drainage scheme.

The President having expressed the extreme interest which he felt in the visit to the Waterworks, put the vote of thanks to Mr. Bretland, and it was adopted by acclamation.

Mr. Bretland, in acknowledging the vote of thanks accorded to him for his paper, said he was happy to hear, from the experience of Mr. Fowler, that public street improvements could be made which would ultimately turn out, not a loss, but an advantage to the ratepayers. The timber sewer which had struck Mr. Meade as being unique had emanated from the minds of Sir Joseph Bazalgette and Sir Frederick Bramwell; and he admitted that its construction was the most difficult work he had ever undertaken in his life.

[We will conclude our report of this meeting next week.]

Illustrations.

AMBONE FROM THE CATHEDRAL, SALERNO.

THIS is a reproduction of a pencil-drawing by Mr. F. D. Bedford, which was exhibited at the last Royal Academy.

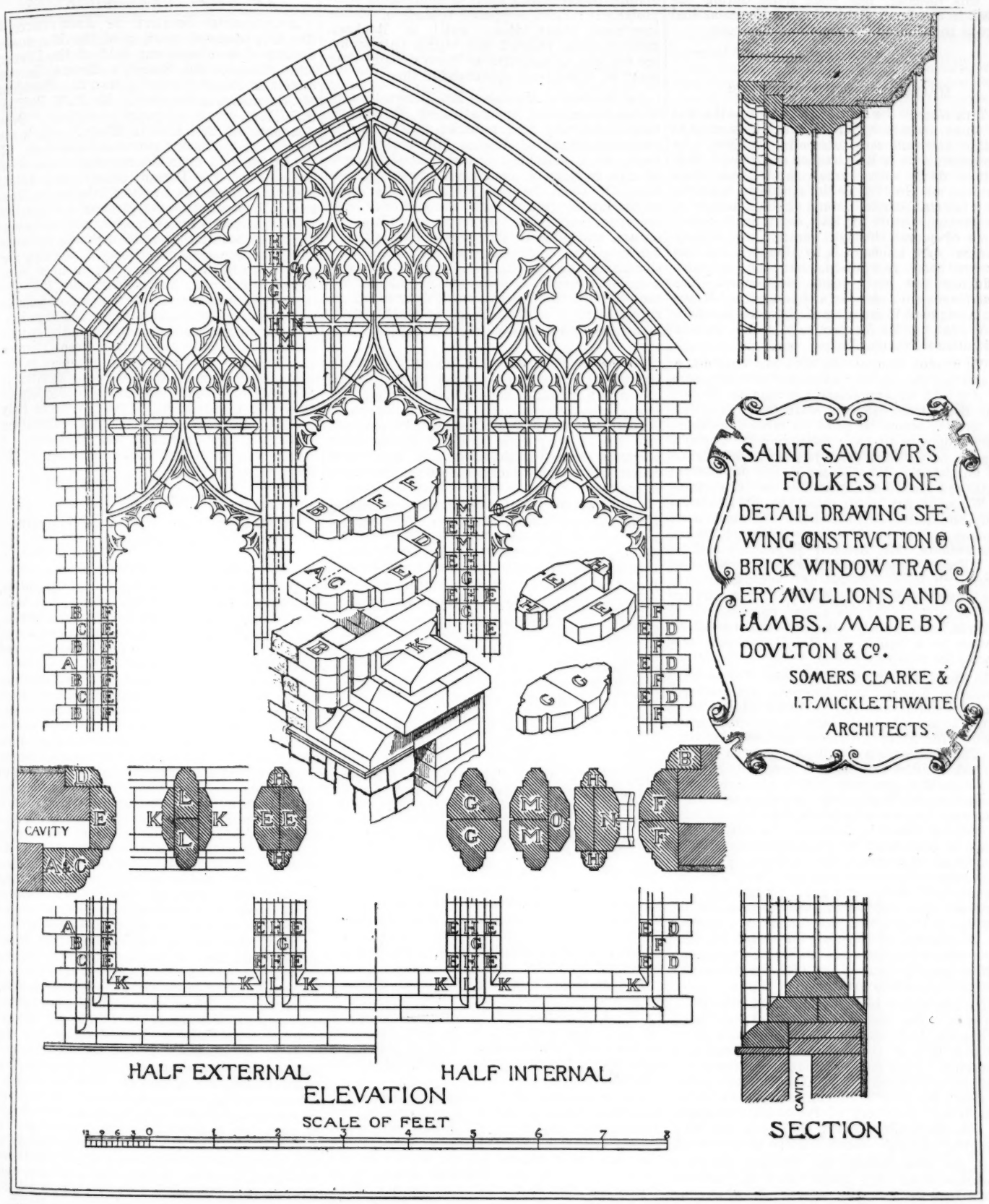
The upper part of the pulpit is of white marble inlaid with mosaic,—gold, white and red,—arranged in geometrical patterns. The circles in the panels are of green and red porphyry. The columns are of granite and are 9 ft. high; the capitals and bases are of white marble. The pulpit is a noted example of South Italian Mediæval work.

The steps leading up to the pulpit are at the back, encased in marble.

WINDOWS, TRINITY AND ALL SOULS' COLLEGES, OXFORD.

THESE two windows, the drawings of which were exhibited at the Royal Academy of this year, were designed by Mr. James Powell, of the firm of James Powell & Sons.

The Trinity window was erected some years ago, with several others of a similar style of design. The All Souls window is the first of a series for the hall of that College. The central figure represents Sir C. Wren; below are the arms of Messrs. Buller & Curzon, the donors of the window. The arms above are those of



Sheldon & Gardiner, two of the Wardens of the College during Wren's time. The figure of Wren is taken from a portrait.

ST. SAVIOUR'S CHURCH, FOLKESTONE.

This church, when complete, will consist of a nave of four bays, with north and south aisles, and a large western tower opening into it; of a chancel of two bays, with north and south aisles, that on the south being used as a side chapel, and on the north as an organ place. The sacristy and choir-vestry adjoin the organ place. The chancel is 39 ft. long inside; the nave and tower 97 ft. long. The width of the nave and chancel, which have a roof running through continuously from east to west, is 26 ft. 6 in.; each aisle is 18 ft. wide, and the total internal width is 67 ft. To the wall plate there is a height of 30 ft. from the nave floor, and to the ridge of the pointed barrel-ceiling is 43 ft. Over the choir-vestry is a blowing-room for the organ.

The church stands on clay and is in a very exposed position. The sea air soon eats into stonework. The outside walls of the church are, therefore, built hollow, with an outer skin of Kentish rag with brick dressings and an inner skin of brick, the two being tied together with slabs of paving-stone. The dressings are of brick. The window-jambs and tracery are of terra-cotta made by Messrs. Doulton. The object the architects have had in view in designing the window has been to treat terra-cotta as what it really is,—superior brick, and not sham stone. The pieces are all small, and range in colour, jointing, &c., with the adjoining brickwork.

The church is built inside of hard rough brick to receive plaster. The piers will be decorated with sgraffitto, as will be the spandrels above the arches. The arches themselves will have mouldings in plaster, treated flatly and to suit the material, and in no way to imitate stone. The inner ceiling of the nave and chancel, which takes the form of a pointed barrel-roof, is in plaster with wood ribs. The aisles, which have flat roofs, are covered with Fawcett's fireproof system of hollow tube construction, laid on the outer side with Claridge's asphalte. The chancel is paved with squares of black and white marble. To isolate this floor from the damp it is laid on Fawcett's fire-clay tubes. Wall panelling will be carried round the church, and the bases of the piers are also to be similarly encased.

At present the chancel, one bay of the nave, the organ place, and the sacristy are completed and in use.

The builder is Mr. Dunk, of Folkestone; the architects, Messrs. Somers Clarke and J. T. Micklethwaite, of Westminster.

The complete set of drawings, as published

in this number, has been hung during the week in the Loan Exhibition of Ecclesiastical Art at the Church Congress at Folkestone.

MAGAZINES AND REVIEWS.

The *Gazette des Beaux-Arts* contains the first of some articles by M. Eugène Müntz on that rather new and very interesting subject, "Le Propagande de la Renaissance en Orient." This article deals with Turkey, and gives some account of Gentile Bellini's artistic relations with Constantinople. Much of the influence of Renaissance art on the East, as far as it existed, came of course through Venice; how largely Venice was influenced by Eastern art has always been recognised, but the converse influence has been rather overlooked. The *Gazette* contains also an article on the "Musée des Antiques à Vienne" by M. Salomon Reinach, and one by M. Mazerolle on "Les Grands Médailleurs Français."

We cannot sympathise with Mr. Spielmann in starting the October number of the *Magazine of Art* with an appreciative article on M. Jan Van Beers, than whom no artist (of any ability) of the day seems to us to be more unredeemably vulgar, or to have done more to degrade the art of painting (always with ability, let it be admitted). Mr. Gilbert E. Samuel contributes the second of his articles on "Copyright in Works of Art." An article by Mr. Harry L. Tilly, on Burmese Art, introduces us to rather new ground and some characteristically grotesque illustrations. Mr. Bernard Hamilton's article on "French Feeling in French Pictures" we read with much interest and sympathy, and the illustrations are well chosen. An engraving by Jonnard of Privet's clever painting "Her Friends," and a finely felt quasi-Mediæval illustration to a ballad, by Mr. C. Ricketts, are among the full-page plates.

In the *Art Journal* Mr. Horace Townsend's article on English and American architecture contains some very well-produced illustrations of the latter. As one reason for the superiority claimed for American street architecture over English (a feeling which is perhaps being carried a little too far), we are told that the rich American generally builds his own town house, the rich Englishman certainly as a rule does not: there is a point in this. An article on "John Linnell's Country" by Mr. A. T. Story is illustrated by some charming slight landscape sketches. Mr. Aylmer Vallance continues "The Furnishing and Decoration of the House" with some good illustrations of textiles. Mr. Huish continues his rambles in the Isle of Wight, and the number is prefaced by an etching of Norwich Cathedral by Mr. Slocombe, in which the tower and spire are rather heavily touched, or else the plate has not printed satisfactorily.

The *Antiquary* includes Mr. Micklethwaite's paper on "The Restoration of Churches," read at a recent Archæological Congress, and a paper by the Rev. J. C. Cox on "The Marshland Churches," with some illustrations which are not very satisfactory from an architect's point of view; the Rev. B. J. Harker contributes an article on "Discovery of Pre-historic Remains at Grassington," and Mr. G. Payne one on a discovery of Anglo-Saxon remains at Rochester.

In the *New Review* Mr. Frederic Harrison broaches some very crude views on "London Improvements," in the course of which he ventures the astounding, we might say impudent assertion that it is the working men only who care for and appreciate London, and are interested in preserving its beauty. Mr. Harrison winds up with an eloquent sentence in hopes of our "yet seeing a noble London, worthy of its past history and its future greatness"; and in partial furtherance of this hope he suggests the removal and rebuilding of one of London's noblest structures, Waterloo Bridge. It is a pity able men like Mr. Harrison will rush into print about matters they do not understand.

The *Fortnightly Review* presents us with an article on Raphael by a genuine art critic, Mr. Walter Pater, whose words on things æsthetic, if a little over-refined, are always worth reading. He draws attention among other things to Raphael's great power of narrative painting, and suggests that some of the practical life of Florence, by contrast with the more ideal schools from which he came, gave to his work this turn for real expression of human action. On the other hand, he remarks well on Raphael's noble manner of expressing ideas through figure composition: "Plato supposed a kind of visible loveliness about ideas: well! in Raphael, painted ideas, painted and visible philosophy, are for once as beautiful as Plato thought they must be, if one truly apprehended them."

In *Scribner's Magazine* Mr. Brownell continues his critical dissertation on French art, with some very just remarks on the earlier romantic school of France (Delacroix, Géricault, &c.), remarking on their Classic reserve of style in spite of romantic tendency of feeling. On Corot he says well that his great power lay in getting so far away at once from pigments and from the mere actualities of nature, and that if the Greeks had left any landscape we might fancy it would have been something like Corot's. Mr. Brownell, however, has not corrected or acknowledged his portentous blunder in the last month's number, in representing a celebrated Turner as a Claude, while he was actually maintaining Claude's superiority.

Harper's Magazine this month contains nothing of special interest in an artistic sense, unless we include under that heading the second of a rather ghastly series of papers on "A Collection of Death Masks" of eminent men, who, if they were bored by having their portraits taken in life, might at least have claimed that their faces should be let alone after death.

The *Atlantic Monthly* contains two articles of special interest to our readers, "The Betterment of our Highways," an essay by Mr. N. Southgate Shaler on the treatment of highroads in America; and Mr. Theodore Child's well-illustrated article on "Paris along the Seine."

Harper contains No. 5 of Mr. van Brunt's articles on "Architecture at the Chicago Exhibition," describing the Fisheries building, and giving some illustrations of original designs for capitals in which fish, frogs, &c., are worked in. These are spirited, but too naturalistic; if naturalistic modelling of animals is desired, a capital is not the place for it; formal treatment is necessary here, and the outline of these capitals is ragged and unpleasing. An article on "Picturesque Plant Life of California," by Mr. C. H. Shinn, has some curious and interesting illustrations of vegetation. Mr. Stillman, in "Italian Old Masters," deals this month with Correggio, his brief criticism on whom about sums up the truth concerning this much-discussed artist.

Macmillan's gives an article by Mr. A. G. Hyde on "New England Architecture," the continuation in New England of the English form of domestic architecture of late Jacobean period; a kind of article, however, which almost demands illustrations, which are not in *Macmillan's* programme.

The *English Illustrated Magazine* contains an article, "A Summer among the Dovecotes," by Mr. A. Watkins, with illustrations drawn by Mr. C. M. Geere and Mr. E. H. New, from the author's own photographs. Few of the dovecotes shown, however, have any very picturesque character.

Among articles of the month on practical or scientific subjects we may mention in the *Gentleman's Magazine*, "The Sun among his Peers," by Mr. J. Eliard Cooke, a comparison of the sun with others of the stars; in the *Asiatic Quarterly*, the "Physical Geography of Persia," by Mr. E. C. Biddulph; in the *Nineteenth Century*, "Can Mount Everest be Ascended?" by Mr. Clinton T. Dent, who thinks we may yet become acclimatised to existence at an elevation of 29,000 ft., and calls the ascent "a tremendous undertaking, but a magnificent possibility;" in the *Contemporary*, "The Recent Heat-Wave," by Sir R. Ball, who gives his explanation of the phenomenon, and an article on "The Rise of the Coal Trade," by Mr. R. L. Galloway, a kind of history of the use of coal as fuel.

Infectious Diseases Hospital, Keighley, Yorkshire.—At the monthly meeting of the Keighley Town Council on the 4th inst., the Mayor in the chair, the competitive set of plans for the proposed infectious diseases hospital, sent in by Messrs. Judson & Moore, architects, Keighley and Bradford, were approved. The hospital, which is to provide isolated departments for typhoid fever, scarlet fever, and smallpox, with administrative block and outbuildings, will cost about 4,000*l*.

ARCHITECTURAL SOCIETIES.

Manchester Society of Architects.—The first sessional meeting of the Manchester Society of Architects was held at the Literary and Philosophical Society's Rooms, George-street, on Tuesday evening last, the President, Mr. Salomons, in the chair. Mr. F. W. Bedford, A.R.I.B.A., read a paper entitled "Some Accounts of the Arts in Sicily," which was illustrated by lantern views and sketches. He lightly touched upon the remains of the Greek Temples of the Dorian colony, and chiefly devoted his remarks to the Christian architecture. Illustrations were given of the interiors, showing, besides varied marbles and sculptured work, the beautiful mosaics covering the walls, and in some cases the ceilings, of the churches and cathedrals, amongst the number being those at Palermo, Monreale, Cefalu, &c. The lecturer pointed out that Fergusson believed that it was only through these buildings that we could judge whether polychromy by opaque pictures in mosaic or by translucent pictures on the glass of our stained windows is the more beautiful mode of decorating an interior. A very large and admirable collection of drawings, made during a year's tour in Italy by the lecturer as Owen Jones Travelling Student of the Institute, was exhibited. A hearty vote of thanks was accorded to Mr. Bedford for his paper.

THE CLEANSING AND VENTILATION OF SEWERS:

SOCIETY OF ENGINEERS.

At a meeting of the Society of Engineers, held at the Town Hall, Westminster, on Monday evening last, Mr. Joseph William Wilson, jun., President, in the chair, a paper was read by Mr. B. A. Miller on "The Cleansing and Ventilation of Pipe Sewers."

The author having mentioned the difficulties which had been experienced in many towns sewered on the combined system, owing to the road *detritus* being washed into the sewers through inattention to gully cleansing, drew attention to the necessity of constant flushing to prevent the generation of sewer gas, due to the decomposition of deposited matter; he further stated that sewerage systems, though well designed and carried out, were often rendered incomplete owing to faulty house connexions and insufficient water supply. He then compared the systems of combined and separate sewering, giving the following reasons for preferring the latter:—Smaller sewers are required; surface water drains need not be laid as deep as sewers; the exclusion of surface water gives less liquid to deal with and be treated; there is greater regularity in the flow, enabling the size of sewers to be calculated more accurately; the sewers, being smaller, afford less space as gas-holders, and require less water to flush. He recommended the admission of roof-water into the sewers, as simplifying the arrangement of drains. He then alluded to flushing, giving the different methods employed. The use of penstocks or plugs, causing the sewage to back up, he considered unsatisfactory, as deposits are left in the pipe to decompose. In preference he advocated the adoption of flushing chambers, containing automatic syphons, mentioning those of Messrs. Doulton, Rogers Field, Adams, and Palmer, and proceeded to describe their action, giving preference to those with a deep trap.

Passing to the question of ventilation, he stated that provision should be made to prevent sewer gas passing directly into the air we breathe; and proceeded to enumerate the different methods employed for ventilating sewers, describing first the usual method by shafts from the sewer to the street level, with open gratings in the roadway, intended to act as outlets and inlets, but which were often an annoyance owing to the irregularity of their action. Briefly mentioning the use of charcoal filters, and the utilisation of chimney-shafts, he described the Holman-Keeling sewer-gas destructor, which he considered effective, though costly, and suggested the erection of iron shafts, either open at the top or provided with cowls, which could take the place of street lamps, placed on the line of kerb and connected with the sewer.

The author next gave a description of a series of experiments taken in one of these shafts at Beckenham, with a view of ascertaining the advantage of ventilating sewers by ven-

tilating lamp-posts as compared with the ordinary method of gratings in the roadway. The result of these experiments were embodied in a series of tables and charts, and by their means the author showed that the best results were obtained when the street ventilators were open, and further, that the direction of the wind was the chief agent which influenced the movement of sewer air in the shaft, the temperature also affecting it under certain conditions. In conclusion, he recommended, in order to keep sewers in their proper state, periodical flushing by automatic chambers, and an efficient method of ventilation by ventilating-posts, which, he considered, would produce a better current of air in the sewers than is obtained by the ordinary method of street openings alone.

The paper was well illustrated by diagrams, showing the various systems advocated.

Sir Henry Roscoe, M.P., F.R.S., has recently been elected an Honorary Member of the Society of Engineers, in the place of Professor John Couch Adams, F.R.S., deceased.

THE LONDON COUNTY COUNCIL.

The usual weekly meeting of the London County Council was held on Tuesday afternoon at Spring-gardens, the Chairman, Mr. John Hutton, presiding.

Finance: Terms for Repayment of Loans.—In submitting the report of the Finance Committee, Mr. Evan Spicer stated that they had carefully considered whether the rate estimates needed revision. So far as had been ascertained, although some Committees had sent in supplemental estimates, others had made reductions, and as there remained a balance of the Exchequer contributions the Committee would not have to ask for any increase upon the amount voted at the beginning of the year. He hoped the Council would consider this satisfactory, and that a still more satisfactory report would be presented at the end of the financial year. The Finance Committee also reported that they had for some time been in communication with her Majesty's Treasury with a view to obtaining their sanction to the repayment of loans advanced by the Council to other public bodies by the annuity system instead of the instalment system when so desired by the borrowers, and had now the satisfaction of reporting that the Treasury had given a general consent to the repayment of loans on the annuity system for the following periods:—For the purchase of land in fee simple, fifty years; for the purchase of houses or for building purposes, thirty years; for fittings and expenditure of less permanent character, not exceeding fifteen years.

Resignation of the Comptroller.—The General Purposes Committee presented a report in which they said: "We regret to have to report that a letter has been received from Mr. Gunn, requesting permission to resign his appointment of Comptroller to the Council. On the 5th of July last we reported that Mr. Gunn had been suffering from ill-health for some months, and the Council then, on our recommendation, granted him six months' leave of absence on full pay from June 1. Mr. Gunn states in his letter, dated August 31, that twelve weeks had elapsed since he left London, but that there was no sign to encourage the hope that he would ever be fit for active duty. He therefore asks the Council at its convenience to accept his resignation and to grant him a pension, expressing at the same time the hope that the 5th section of the Superannuations Act, 1866, may be taken as applying to his case. The Council can grant to an officer resigning his office under the provisions of the Act an annual allowance at the rate of a sixtieth of his salary in respect of each year's service not exceeding forty years; but there is an additional provision (section 5 to which Mr. Gunn refers) that in the case of a person appointed to an office when over thirty years of age on account of professional or other peculiar qualifications not ordinarily to be acquired in the Council's service, the Council may in computing the amount of his superannuation allowance add a number of years not exceeding ten to the number of years he may actually have served. Mr. Gunn was thirty-two years old when he was first appointed in February, 1869, Accountant to the late Metropolitan Board of Works. He came from the Treasury, where he had acquired considerable knowledge and experience in matters of finance; and we think the experience he thus brought may properly be regarded as a 'peculiar qualification' such as is referred to in section 5 of the Act. Mr. Gunn's services to the Council as well as to the late Metropolitan Board have been so valuable, and his labours during the last three years, owing to the great changes and complications entailed by the Local Government Act, 1888, have been so arduous, that we think the Council may be advised to grant him a retiring allowance of the highest amount authorised by the statute. We accordingly recommend:—

'That Mr. Gunn's resignation be accepted, and that the Council do grant to him a retiring allowance of 660*l.* a year, being at the rate of thirty-three sixtieths of his salary of 1,200*l.* a year, ten years being added to his twenty-three years of actual service, as authorised by the 5th section of the Superannuations Act, 1866.''

Mr. Crooks moved, as an amendment,

"That Mr. Gunn's resignation be accepted, and that the Council do, under the provisions of the Superannuations Act, 1866, grant to him in respect of his twenty-three years' service a retiring allowance of 460*l.* a year, being at the rate of twenty-three sixtieths of his salary of 1,200*l.* a year."

After a long discussion, in the course of which Mr. Gunn's services in the work of the financial administration of the Metropolis were highly eulogised, the amendment was defeated by one vote (57 against to 56 for), and after a further amendment which sought to fix Mr. Gunn's retiring allowance at 600*l.* had been negatived, the recommendation of the Committee was agreed to.

Proposed purchase of Street Tramways.—Mr. Benn, M.P., Chairman of the Highways Committee, moved that a notice should be forthwith served upon the North Metropolitan Tramways Company, requiring the Company to sell to the London County Council certain tramways, works, and undertakings; that the Clerk should be instructed to apply to the Board of Trade for its approval of the terms of this resolution; and that the Finance Committee should be empowered to take the necessary steps to obtain the insertion in the Council's Money Bill of 1893 of a clause empowering the Council to raise the money required. He said the purchase of this particular tramway was likely to prove a good investment for the ratepayers. According to the last report of the Company in question, which owned 49 miles of tramway, a sum of 2,120*l.* per mile per annum had been earned.

Mr. Boulnois, M.P., as an amendment, moved:—

"That, inasmuch as an arbitration is now proceeding with reference to the terms upon which the Council should purchase a part of the undertaking of the London Street Tramways Company, the Council is of opinion that the result of that arbitration should be ascertained before the Council resolves to purchase the undertaking of another Company."

He contended that it was only reasonable that the amendment should be adopted. He admitted that his motion was a dilatory one, but he believed that delay was desirable under the circumstances. The ratepayers would require to be satisfied that the Council were proceeding with caution, and had carefully weighed facts and figures; and how could it be said that they had done so in the absence of any facts or figures?

Mr. Beachcroft seconded the amendment. He suggested that the Finance Committee should carefully consider the whole subject before the Council arrived at any decision. He considered, also, that before any definite action was taken, information should be procured from the twenty-three boroughs in the kingdom who had purchased tramway undertakings as to the result of their experience. The Council should also learn what return they received, and, to obtain that information, the resolutions might well stand over for two months.

Mr. Bassett Hopkins contended that there was abundant evidence before the Council to show that the tramway they proposed to purchase would prove a most profitable investment. He trusted that the Council would reject the amendment. The thirty corporations in the Kingdom were perfectly content with the result of the undertakings they had purchased, because in no single instance had any desire been evinced either to retrace their steps or to repent the bargain they had made. In some cases timidity became almost criminal, and he hoped the Council would follow the dictates of common sense and adopt Mr. Benn's resolutions.

The closure was applied, and the amendment rejected by a large majority.

Mr. Antrobus moved a further amendment, that the Council, in adopting the resolutions, should agree not to work the tramways themselves. The Council had been told that the Corporations who had purchased the tramway undertakings were not anxious to retrace their steps; but they must not forget that they had been purchased on reasonable terms, and they got a good return for their money.

The amendment having been seconded,

Mr. John Burns, M.P., said the Corporation of Glasgow expended 120,000*l.* upon the construction of tramways, and in the eighteen years they had received 150,000*l.* from the company to which they leased them, whilst, in addition to a percentage of the cost of repairs and maintenance, the company had during that period paid a dividend of 8 per cent. The Corporation now decided to work the lines themselves, and secure this 8 per cent. for the community. He hoped the Council would acquire all the tramways in the Metropolis, and establish a uniform penny fare, accord humane treatment to the men, and become the medium for giving convenient traffic and vehicular accommodation to the people of this city; and not allow it in the future to be what it had been too long, an orange to be squeezed by private companies in the interest of the few and to the detriment of the many.

The closure was again applied, and the amendment rejected.

On a division on the resolutions the figures were:—For, 92; against, 24; majority, 68.

After transacting other business, the Council adjourned.

Correspondence.

To the Editor of The Builder.

"THE INSTITUTE OF ARCHITECTURE."

Sir,—I am largely in sympathy with Mr. Belcher, and if I were not I should respect his opinions, but I cannot accept his methods. The composition of the Institute and its objects are defined by charter, and its routine is, for the time being, fixed by by-laws. What he and those who think with him want is something far too important to be effected by changes in names, or to be brought about by discussions as to the nature of our art or the mental qualifications of its practitioners.

The Institute exists "for the general advancement of civil architecture," and for the study of "the various arts and sciences connected therewith," the art "tending greatly to promote the domestic convenience of citizens and the public improvement and embellishment of towns and cities." The breadth of this definition is only brought out more clearly by the by-laws, which, moreover, stamp it as a professional society, admitting a very few outside members for the help they can give to it. The precautions taken before admitting a member aim at ensuring that he has been trained in some satisfactory way for the practice of the profession, that he is likely to act fairly between clients and builders, and to behave with decent civility to his brethren, even if they may not be quite up to the high standard which he has set up for himself. It is impossible for a body constituted on such a basis to ensure that each of its members shall reach the standard which every other member demands in respect of the particular branch of the profession which he lays closest to heart. If it were to seriously attempt such a task all round it would dwindle to the smallest society in England, and become utterly useless for its purpose. What it can do is to ensure that each candidate for membership shall reach a standard in each department of professional work which shall be reasonable and sufficient. It is pretty sure to make mistakes, but it should be open to reason, and should welcome all honest attempts at improvement. This is what I think the Institute does; but it cannot do what every individual, or every group amongst its members, asks it to do, and, particularly, it cannot turn itself into something else at the instance of gentlemen whose sphere of usefulness appears to be outside its walls.

But what I more particularly wish to suggest to Mr. Belcher is that he can get all he really wants without this disturbance. What he wants is evidently the want of a few,—of a select few

It cannot be expected that the views and feelings to which he gives expression will be held by the many, until they have advanced beyond their present stage. Why should not men having common feelings and objects form themselves into a club or group within the Institute and work out their ideas in their own way? They might even consort with outside architects and might do many things within their sphere that cannot be undertaken by a body having the great variety of objects with which the Institute is charged. There is a good old rule of the Architectural Association enabling members desirous of associating for the study of any specific subjects to join together for that purpose under the sanction of the Association, and either with or without official sanction such groups might be usefully formed provided they were formed openly, were loyal to the parent body, and did not degenerate into cliques. We could afford this risk.

Why should the man who, having gone through the training which is thought suitable, finds his vocation chiefly in promoting "the domestic convenience of citizens" be denied the title of architect and dubbed a surveyor? If you exclude from the higher title every one whose designs you don't like, where is exclusion to end? A sensitive man's list of true artists would necessarily be a short one; it might dwindle to two names, with doubts about the second. Unquestionably the really original mind would be excluded from all such lists,—till, as Mr. Belcher says, years of neglect had passed over his work.

The Examination is a thing much more elastic than charter or by-laws. If it is defective, as I think it to be in some respects, it is open to fair criticism. If it excludes men who can construct what they design, and are otherwise worthy, it ought to be reformed. I am afraid that any examination must exclude some whom one would like to bring in, for there are men who so shape themselves that they will pass through no mesh of any recognised gauge; but even these need not be injuriously affected by the Institute. It is rather for the Government, as representing the general public, than for the members of a professional body to say that such persons shall not be entrusted with responsible work, and this question is not likely to arise until much greater danger can be apprehended than is now threatening.

I fail to see the object of making the title of "Fellow" a distinction. The dictionary and our charter concur in making this word denote equality, and my private view is that every man whom the Institute considers fit to take the responsibility of practice on his own account, should be made equal in all respects with his seniors who can be no more than fit. If we must have distinctions they should be denoted by some more suitable name.

We are getting into a quarrel; at the end of it we shall have to sit down in peace together. My advice is that of "un vieux gentilhomme éprouvé en divers hazards nommé Echephron,"—that we sit down in peace now.

THOS. BLASHILL.

SIR,—My friend Mr. Nevill seems very angry with me, and says I have forgotten that Vitruvius requires architects to be able to decide questions of "light and air." I believe Vitruvius also says that we ought to be good musicians. But what do Vitruvius and Mr. Nevill mean by "questions of light and air?" If they mean that an architect ought to be able to see that his employer's windows are likely to be darkened by his neighbour's new building, I quite agree that an architect ought to possess that needful measure of common sense and observation. But if they mean that he is to sit as an arbitrator at five guineas a day and award pecuniary damages or compensation in such cases, I submit that that is surveyor's work and beyond his province.

All we argue for is that architecture is architecture, and surveying is surveying,—that an architect's work has nothing to do with ground leases, building speculations, arbitrations, valuations, or even quantity-measurement, all which belong to the surveyor.

I fail, however, to see why Mr. Nevill should be angry and accuse us of wanting to put him into iron bonds to which the restrictions of the Institute are nothing. We do not want to put either him or anyone else into iron bonds. As I said in my former letter, we only ask to be let alone, and not to be put into bonds ourselves by Mr. Nevill and his friends, be they ever so silken. If Mr. Nevill likes surveying, by all means let him follow it if he thinks he can combine it with architecture. We shall not prevent him; but I feel sure that were he to do so we should not have such good work from him in the future as he has given us in the past.

T. G. JACKSON.

MR. SCOTT-MONCRIEFF'S PROCESS FOR TREATMENT OF SEWAGE.

SIR,—In your interesting "Note" upon the experiments I have been making at Ashtead upon the treatment of sewage by the intervention of a large colony of micro-organisms, I think you have overlooked the important factor of rapidity which is characteristic of the process. What occurs is more like the action of a ferment, such as yeast, than of the slower changes which occur in the production by bacteria of "ptomaines," "enzymes," &c. If these poisons, which are the characteristic products of putrefaction in meat and especially in fish, were to occur with the same rapidity in the larder as the change which takes place in a "Cultivation filter bed" among its organic refuse, meat and fish could only be used, after their preservation by salting, the moment life was extinct. Among the numerous products which I soon hope to discover in my laboratory I do not think it is at all likely that any poisons which require a long time for their development are likely to be found. The effluent I obtain is, after all, nothing more than the normal product of Nature which has found its way through the watercourses to the sea since the existence of animal life on our planet. Any attempt to arrest such a universal process must end in obvious failure, although the use of disinfectants and chemical processes were multiplied a thousandfold. It appears to me that my experiments point to the practicability of utilising these natural processes so as to make them do vastly greater, more concentrated, and more beneficent work than they have hitherto done. It is certainly necessary to take all precautions such as your note suggests, but I am strongly impressed with the opinion that the best way of disposing of the effluent which I obtain is by its assimilation by vegetation. Meantime this effluent is produced without the use of chemicals or tanks, and practically without sludge. All this is certainly a step in the right direction.

W. D. SCOTT-MONCRIEFF.

AN ANCIENT PAINTING.

SIR,—With reference to the ancient painting discovered at Wenhaston Church, Suffolk, which is noticed in the *Builder* (p. 269) last week, I should like to hazard the following conjecture, dangerous though it be to say without seeing. It is this, that this painting on oak boards of the Last Judgment either was placed over the chancel-arch, against the east wall of the nave, or much more probably that it filled in the chancel-arch between the rood-screen and rood-loft (if there was a loft) and the arch above it. So that the local paper was probably right in the main when it spoke of the painting "forming the upper part of the chancel-screen," for it would no doubt rest on the loft. The position of the crucifix, so clearly marked out, and the "two bottom side panels" being apparently formed by the carved mages of patron saints (SS. Mary and John certainly), as well as the subject,—the Doom,—so often painted in the same place, seem to me to make my conjecture very probable. I have drawn attention to a similar feature in Coates-by-Stow Church. On the oak boards which shut off the chancel-roof just to the east of the rood-loft are remains of paintings; on the north side a figure with a nimbus can be dimly discerned; and on both sides are flowers with leaves, which most likely are lilies.* Pugin gives a view of a somewhat similar arrangement at Urnes, near Bergen (now destroyed, I believe), but I have not succeeded in getting any more instances. The reason of their scarcity is obvious; when the rood-lofts came down, almost of necessity these boardings came down too, especially as they were so adorned with painting. Whatever the explanation, this at Wenhaston is a most interesting discovery.

E. MANSEL SYMPSON.

P.S.—Mr. Keyser, in his valuable work on Mural Decoration (S and A Department), notes that at Mitcheldean, Gloucestershire, on a set of panels above the chancel-arch, is the Day of Judgment and scenes from the Life of Our Lord, of the time of Edward IV. Also at St. Michael's, St. Alban's, is the Day of Judgment, with crucified Saviour in the centre, over the chancel arch and partly on a panel filling in the head of the arch, while over the rood-loft in Snetterton Church, Norfolk, is a defaced panel painting of the Day of Judgment. I may add that the Scandinavian example from Pugin has nothing to do with the painting of the Doom; it only resembles the general arrangement at Coates and elsewhere.—E. M. S.

* Lincolnshire Rood-screens and Rood-lofts. Assoc. Archit. Societies Reports and Papers. 1890.

The Student's Column.

CONCRETE.—XV.

SAND (*continued*): ANGULARITY.

THE sharper the sand is the better. The angularity of the grains helps to bind them together to give them a sort of bond. The advantages of angularity are clearly evident in surfaces subjected to much wear, as paving; from these, round smooth grains are detached much more easily than irregular sharp grains. Sand obtained by crushing hard, compact rock, is very good in this respect; sea and river sand is not as good, but varies very much according to the place where it is obtained.

Experiments made by Mr. Kinipple on two mortars composed (1) of 1 part Portland cement and 1 part sand obtained by crushing sandstone in a Blake's crusher, and (2) of Portland cement and pit-sand in equal proportions, showed the former to be over 50 per cent. stronger than the latter. This was doubtless due to the superior angularity, cleanliness, and coarseness of the crushed sand.

4. *Hardness.*—There are some sandstone, limestone, and even igneous rocks, which crumble almost at a touch, and the grains of which are soft and easily crushed. These ought not to be used. As a rule, the harder the rock the better will be the sand obtained from it. The grains, however, ought not to be smooth and round, as we have already stated.

5. *Durability.*—It would be folly to make concrete walls with an aggregate which would soon succumb to the action of the atmosphere. There is, however, little fear of any natural sand being deficient in durability, but the sand obtained by crushing certain limestones and sandstones, which weather badly as building stones, ought to be carefully examined before its use is permitted. As a rule, a hard-grained sand will prove durable.

Substitutes for Sand.—It is not always that natural sand, or sand crushed from natural rock, can be obtained. Ground brickbats or pottery, burnt and ground clay, slag-sand, coke-breeze from gasworks, smithy-ashes, &c., may be used as substitutes. The ground brick-bats, if well-burnt and free from dirt, old mortar and lichens, make good mortar. Clay should be thoroughly burnt or it will irretrievably spoil all mortar or concrete in which it may be mixed. The dust of brick-bats and burnt clay is considered to confer a small amount of hydraulic energy on fat limes. Coke-breeze is not to be recommended for use in walls and foundations, on account of its porosity and weakness. Smithy-ashes and foundry-sand have been recommended by some authors but do not always give good results. Soot ought to be avoided.

A series of experiments of considerable interest were made by Lieutenant Innes, R.E., and read to the Institute of Civil Engineers.* The briquettes were made of Portland cement and sand, or substitute for sand, in the proportion of 1 to 2, and were kept in water until tested. All grains exceeding one-twelfth of an inch were removed from the various sands, &c., but apparently no attempt was made to remove the fine dust in any of them. (See table, p. 287.)

The mortars made with smithy-ashes and clay-ballast were apt to shrink and crack. Lieutenant Innes's experiments showed, therefore, that the clay-ballast gave the best results, and the other sands, &c., followed in this order,—Portland stone-dust, ordinary coarse sea-sand, rough pit-sand, smooth pit-sand, drifted sea-sand, and, lastly, smithy-ashes. If the table be considered in the light of our remarks about the essential characteristics of good sand, the differences between the various sands and substitutes will be easily explained.

AGGREGATES.

The number of different materials which have been used in concrete is very large. We may mention gravel, shingle, broken stone of various kinds, broken brick and pottery, burnt clay and shale, coke-breeze, slag, shells. The

* Proceedings I.C.E., Vol. xxxii., 1870-1.

TABLE XIX.

Tests of Various Sands, &c., and Cement.

Number.	Nature of Sand, &c.	Voids per cent. Dry.	Voids per cent. Wet.	Shrinkage per cent.	Grains above 1/10 in.	Tensile Strength in lbs. per sq. in. Three weeks.	Tensile Strength in lbs. per sq. in. Proportional value of Sands.	Tensile Strength in lbs. per sq. in. Three months.	Tensile Strength in lbs. per sq. in. Proportional value of Sands.
1	Neat cement	—	—	—	—	450	—	529	—
2	*Sea Sand*, roughish and uneven grain, chiefly siliceous, clean.....	38	34	6	94	140	52·4	249	70·1
3	*Sea Sand* (*drifted*), siliceous, clean.....	43	36	11	8	60	22·3	193	54·3
4	*Pit Sand*, containing small shells, &c., grains of unequal size, siliceous	32	19	16	15	108	40·1	248	69·8
5	*Pit Sand*, grains smooth and uniform, siliceous, clean	41	34	11	76	94	34·9	175	49·8
6	*Portland Stone Dust*, roach and whitbed, grains rough and irregular, clean	46	34	18	56	165	61·3	254	71·5
7	*Smithy Ashes*, containing much unburnt coal-dust, grains rough and irregular	64	52	25	56	38	14·1	91	25·6
8	*Clay Ballast*, burnt and ground, pale brick-red colour, rough, uneven grain, containing much dust	50	40	17	40	269	100	355	100

selection of an aggregate is largely influenced by the locality in which the work is required, and by the use to which the concrete is to be put. The aggregate which is most easily available and most economical is usually employed. It would be a waste of money to specify burnt clay for a building on the site of which stone suitable for breaking could be obtained, while the clay would have to be brought there at considerable expense, for any reasonable inferiority of aggregate can be remedied by using with it a proportionately larger quantity of cement.

The remarks about the cleanliness, angularity, hardness, and durability of sand may be applied with equal truth to the aggregates. But a little further information about the more common kinds of aggregate will be useful.

Gravel and Shingle.—Ordinary gravels contain a considerable quantity of sand, varying, perhaps, from one-third to one-half the total volume. This may advantageously be sifted out, so that the several ingredients of the concrete can be accurately measured. Gravel from pits and from sluggish streams ought to be washed before being used, as the former will probably contain clay in considerable quantities, and the latter may be coated with fine mud or slime, or may contain an excessive amount of very fine sand; but gravel and shingle from some parts of the sea-beach and the beds of rapid streams do not need further cleaning. For rough concrete in ordinary foundations, &c., gravel forms a good and economical aggregate, as it may be used in many instances with little or no preparation. The larger rounded pieces in shingle, &c., should be broken, so as to give them a certain amount of angularity, in order that the cement may adhere to them more firmly, and that they may be wedged and bonded together. Shingle, &c., which contains large irregular pieces, makes stronger concrete than that consisting entirely of smaller pieces rounded by attrition.

Opinions differ as to the value of gravel and similar material as an aggregate. Some persons go so far as to say that it is the best of all aggregates, while others loudly condemn it. The fact is that such material, from its hardness and durability, is useful in foundations and walls, where the concrete is subjected mainly to compression; but in floors and other places where it is subjected to transverse stress, it does not form a good aggregate, because of its great weight, the smoothness and roundness of its stones, and the small resistance it offers to the action of fire.

Of two kinds of gravel or shingle, that one is best, other things being equal, which has the smallest interstices; for in this case a smaller quantity of sand is required with the cement, and this is important because the strength of concrete depends largely on the strength of the mortar (*i.e.*, the cement and sand) in which the gravel, or other material, is embedded.

The gravel obtained from the Thames, and usually known as Thames ballast, is an exceedingly good aggregate for foundations and walls, being usually fairly clean and irregular, and containing sand of good quality. All gravel is more or less rounded by attrition, and this of course is a disadvantage. Usually, also, it is not porous enough to admit of the best adhesion of the cement to its surfaces.

Broken Stone.—A great many kinds of stone have been used as aggregates in concrete,—granite and other igneous rocks, flints, sandstones of various kinds, limestones, &c.

Igneous Rocks.—Igneous rocks are largely used as an aggregate, especially for concrete exposed to much wear, as in the facing of breakwaters, dock-walls, coping, and other sea-works. They are also extensively used in the manufacture of artificial stone, paving, &c. Messrs. W. B. Wilkinson & Co. use granite as an aggregate for their concrete paving and flags. Stuart's "Granolithic" paving contains the same material. The paving, &c., manufactured by the Patent Victoria Stone Co. and by the Croft Granite Brick and Concrete Co. are specially-prepared concretes of Portland cement and syenite from Leicestershire quarries. The Imperial Stone Paving also contains crushed granite.

Igneous rocks may be classified as *Granitic*, *Trappean*, and *Volcanic*, but no examples of the last occur in the British Isles. Ordinary granite consists of crystals of felspar, quartz, and mica, and is found extensively in Scotland. There are several varieties, such as syenite, and syenitic granite (containing hornblende, and quarried in Leicestershire, Guernsey, &c.), and porphyritic granite (containing large and independent crystals of felspar in addition to the small ones contained in the general mass of the rock, and quarried at Shap in Westmoreland and at several places in Cornwall and Devonshire).

Trap-rocks are of many kinds, the more crystalline varieties, such as basalts and greenstones (or whinstones), being most suitable for aggregates in concrete; some of the earthier varieties confer a certain amount of hydraulic energy on limes and cements. The Giants' Causeway in Ireland, and Fingal's cave in Staffa are well-known examples of basaltic rocks, and other trap-rocks are found in Derbyshire, Cumberland, North Wales, &c. Mr. Thomas Dyke states that whinstone withstood the grinding-test for wear much better than either granite or shingle, blocks of each being applied under the same pressure to the face of a revolving grindstone.

Granitic and Trappean rocks of various kinds can be obtained from many quarries, broken by machinery into various sizes suitable for concrete. They form an excellent aggregate for foundations, walls, and paving, being hard, angular, and durable. For floors their weight is a disadvantage, and so also is their great liability to crack or disintegrate under the action of fire.

Flints.—Flints are lumps of grey or black silex, found, usually in horizontal layers, in beds of chalk. They are of all sizes up to a foot or more in diameter, and, when dry, are extremely hard and refractory. Owing to their glassy surfaces they do not form one of the best of aggregates, but broken into suitable sizes they can be used in foundations and walls; their great weight, and their tendency to "fly" under the influence of fire, render them unsuitable for floors. If the flints have been taken from land under cultivation, they ought to be washed before being used.

Sandstones.—It is impossible to mention all the sandstones which are suitable for concrete. A few general observations must suffice. Those sandstones which yield durable building stones will usually yield good aggregates, while those which are friable and which favour the growth of vegetation upon them will not. Sandstones vary considerably in weight and in strength, and this must be taken into consideration; the strongest and heaviest may be used in foundations, walls, and paving, and lighter varieties may be used in floors. All sandstones are apt to crack and split under the influence of heat, although they are not as much affected by it as are granites and limestones. It is not wise, however, to use them in floors which are intended to be fire-resisting. The degree of porosity of the stone has also an influence on the ultimate strength of the concrete; the dense stone which splits into thin layers with smooth mica surfaces, such as Yorkshire flags, will probably not yield as good concrete as a rather more porous rock. But care must be taken that the stone, especially the porous varieties, is well soaked with water before the cement is mixed with it, otherwise the aggregate will absorb the moisture from the cement, and the hardening of the latter will be prematurely stopped.

Old building materials often furnish a convenient and economical aggregate, but, as a rule, they will be much improved by being washed after they are broken.

GENERAL BUILDING NEWS.

PROPOSED "VARIETIES" THEATRE.—A site has been cleared on the western side of St. Martin's-street, Leicester-square, for the building of a new theatre, or rather music-hall, from the designs of Mr. G. H. Greatbach, architect. The site, being about 11,000 ft. superficial, is secured upon an eighty years' lease, at a ground-rent of 1,300*l.* per annum, and the total cost for the theatre is estimated at 87,000*l.* Entrances and exits will be made in St. Martin's, Whitcomb, and Blue Cross streets.

SCHOOL CHAPEL, FOLKESTONE.—On Sunday last services were for the first time held in the new school chapel which has been built at the Grange, Folkestone. The walls are of red local brick throughout, with corbels, copings, and crosses of Morley red stone. The roofs are of pitch-pine, and are covered with local tiles. The seats, which are in oak, face east and west—the apse of the chapel facing north—and are arranged to accommodate seventy-two boys, six masters, and thirty-two visitors. The architect is Mr. Arthur Blomfield Jackson, of London, under whose direction the work has been carried out by Mr. H. R. Mercer, of Folkestone.

RESTORATION OF ST. ANDREW'S CHURCH, FOXTON.—The nave and aisles of the Church of St. Andrew at Foxton, near Market Harborough, are now undergoing restoration. The architect for the work is Mr. William White. The church is also about to be restored. The architect for this section of the work is Mr. H. Hardwicke Langston.

MECHANICS' INSTITUTE AT FELLING, DURHAM.—On the 22nd ult. Sir Charles M. Palmer, Bart., M.P., opened the new Mechanics' Institute at Felling. The foundation-stone of the building, the exterior of which is of stone, was laid in February last by Alderman Lucas. On the ground floor there are a billiard-room, a reading-room, a smoke-room, and lavatories, &c. On the upper floor there are a public room, 39 ft. by 24 ft., a club-room, a library, and an ante-room. Behind the building there are two living rooms for the caretaker. The building has been erected to the plan of Mr. Miller. Messrs. Wallace & Wilkinson have had the general contract; Mr. Faid, the plumbing work; Mr. Sisterton, the painting, &c.; and Messrs. Emley & Sons, Newcastle, have supplied the fittings.

SCHOOLS, ECCLES.—The foundation-stone of St. Andrew's New Schools, in Barton-lane, Eccles, Lancashire, was laid with Masonic honours on the 24th ult. On the ground-floor of the new building is the infants' department, which will comprise a schoolroom 43 ft. by 26 ft. 6 in., and two large class-rooms, also a cloak-room, and a room for the head teacher. There is also on this floor a room 54 ft. by 26 ft., to be used for mission and general parochial purposes. The first floor is taken up wholly as a mixed school for boys and girls. It comprises a room 54 ft. by 43 ft., and five large class-rooms, one of them being furnished for teaching cookery. The large room is readily divisible by movable partitions. A portion of the building on the ground floor has been set aside for use as a young men's institute. The whole building will be warmed with hot water, and every room is provided in addition with an open fireplace. There will be two large playgrounds, separated

from each other by the whole length of the building, containing covered sheds for shelter. The accommodation thus provided for is 743 school places. The contract for the whole of the works has been let to Messrs. W. Brown & Son for the sum of 5,793*l.*, and the work is being carried out from the designs and under the superintendence of the architect, Mr. Henry Lord, of Manchester.

New Church, Harden, Yorkshire.—On the 24th ult. the new Church of St. Saviour, in the village of Harden, was opened and consecrated by the Bishop of Ripon. The church is situated on a sloping site on the east side of the Harden Board School. The style adopted is Early English. There is a nave, chancel, and north aisle, also a vestry, and the main entrance is by a porch at the west end of the building. Provision is also made for a tower. The interior sittings are of pitch pine; the seats are open benches, and there is accommodation provided for 250 persons. The building has been erected by Messrs. Joseph Foulds & Brothers, of Bingley. Messrs. W. R. & R. Atkinson, of Bingley, have executed the joiners' work; Mr. T. Nelson, Bradford, the sittings; Mr. Harrison, Keighley, the plumbing; Mr. Josiah Pickles, Bingley, the plastering; and Mr. W. Walker, of Bingley, the painting. The total cost of the edifice is about 2,300*l.* Messrs. T. H. & F. Healey, of Bradford, have been the architects for the new building.

Cricket Pavilion, Edinburgh.—On the 22nd ult. the Edinburgh Dean of Guild Court granted the application of the Grange Cricket Club to erect a new pavilion on their ground at Raeburn-place. The pavilion will cost nearly 3,000*l.* The lower story of the building will be constructed of stone and the upper portion of brickwork, faced with cement and open timber work. The main building will occupy a site immediately behind the existing structure, and will measure 58 ft. 6 in. by 48 ft., irrespective of a sloping grand stand, which will project about 40 ft. forward from it, and seat about 250 persons. On the ground floor will be a dressing-room, measuring 40 ft. by 20 ft.; a professionals' dressing-room, a bed-room, parlour, and large kitchen for the caretaker, and lavatory accommodation. Entrance to the upper or main floor can be had either by an inside stair or by the inclined gangway which runs up the centre of the grand stand. This gangway gives access to a verandah, in the centre of which under a porch is the entrance to the pavilion hall. This hall, which will have an open timber roof, will measure 56 ft. by 27 ft. 6 in. On one side of it will be a committee-room, and on the other side a dressing-room. On the roof there will be sitting accommodation for about 200 people, the access to this other grand stand being obtained from a square tower, the pinnacle of which will be 60 ft. high. The roof of the tower and of the main building, so far as not set apart for sitting accommodation, will be treated in red tiles. The designs are by Messrs. Cunningham, Blyth, & Westland, civil engineers, Edinburgh.

New Church, Horrabridge, Devonshire.—On the 19th ult. the foundation-stone of a new church for the parish of Horrabridge was laid by Sir Massey Lopes. The new church, designed by Mr. G. H. Fellowes Prynne, of London, will be in the Perpendicular style, and cruciform in shape, with west entrance facing the Horrabridge-road, and two other entrances at the west end of north and south aisles. Gabled transepts are placed north and south, and there will be a flèche at the junction of nave and chancel. The altar will be visible from all parts of the church, being raised seven steps from the nave level. The east window will be of five lights, and arches north and south of the chancel will open into the vestry and organ-chamber respectively. The nave and aisle roofs will be open-timbered, and the chancel roof is wagon-headed. Two arches in the north and south walls of the nave open into small aisles. The building will be of local stone, with Doulting freestone for external dressings and windows, and Bath stone in random square work, pointed, with red for internal dressings. Seating accommodation will be provided for 300 persons. Mr. Fuge, of Horrabridge, is the contractor for the erection of the church, and Mr. C. E. Perkins, of Plymouth, has been appointed clerk of works.

Home for Waifs and Strays, Washington, Durham.—On the 3rd inst. the new schools just erected in connexion with Dame Margaret's Home for Waifs and Strays, Washington Hall, were opened by Sir Lowthian Bell, Bart. The schools have been constructed on the site of the old laundry, from plans by Messrs. Plummer & Burrell, architects, Newcastle. There are two rooms, one being 40 ft. by 18 ft., and the other 28 ft. by 19 ft., each being capable of extension. Cloak-rooms are provided as well as conveniences and a playground. Mr. Thos. Hunter, of Washington, was the contractor for the work.

Extension of Board School, Oldham.—On the 27th ult., the Rev. J. P. Rountree, M.A., Chairman of the Oldham School Board, opened the new extensions of Westwood Board School. The extension consists of the provision on the ground floor of two class-rooms, each 20 ft. by 17 ft. 6 in., and a cookery-room, 25 ft. by 20 ft., with scullery or pantry thereto, the whole entered from a corridor at the end of the infants' school and class-rooms, and which also gives access to the whole of the buildings throughout. On the first floor the extension consists of two class-rooms, each 22 ft. 6 in. by 20 ft., and a manual instruction-room, 25 ft. by 20 ft., the whole entered from a corridor similar to the one below. The class-rooms are divided by folding-screens. At the end of the corridor a staircase for girls, from the first floor, has been erected, and gives access to the girls' playground. The whole of the new portion has been cellared. The new portion is fireproof throughout; all the windows have sashes to open at top and bottom; the floors are covered with wood blocks, and the woodwork is of pitch pine. In addition to the above a teachers' room has been built. The roof of the infants' class-rooms has been altered, and a continuous side-light has been inserted. The boys' stairs having become worn and dangerous, they have been taken down and replaced with stairs of easier pitch and solid construction. The girls' and boys' offices in the yards have also been reconstructed; and in two class-rooms the light has been increased by enlarging the windows and providing extra roof light. The heating and ventilation of the school have also been attended to. The work has been done from plans, &c., prepared by Messrs. Winder & Taylor, architects, Oldham. The contractors are Messrs. E. Whittaker's Executors, Oldham.

New Church, Walsall.—On the 19th ult. the memorial-stone was laid of the new church of St. Paul, Walsall, which is being erected on the site of the late church of St. Paul. The new church will be in stone from the designs of Mr. Pearson, R.A. Its total cost is estimated at about 9,000*l.*

New Hospital, Kilmarnock, Ayrshire.—The new small-pox and cholera hospital, situated on the Bellfield estate, about two miles from the Cross of Kilmarnock, has just been completed. The hospital proper consists of two wards,—a male and female,—for six patients each. The dimensions of each ward are 27 ft. 6 in. by 22 ft., walls 14 ft. 6 in. in height. Attached to each ward is a lobby or corridor leading to lavatories, bath-room, &c. Between the wards is placed a ward scullery and nurses' room. The administrative portion is connected to the wards by a corridor, 18 ft. wide, but at the same time detached from the hospital proper. This portion gives nurses' sleeping-rooms, medical attendant's room, lavatory, &c., also kitchen and room and kitchen for janitor or keeper. The wards internally are lined with white enamelled bricks, the roofs with open timber, and the whole woodwork varnished. The out-buildings consist of washhouse, laundry, unwashed clothes disinfecting room, furnace apartment, and mortuary. Mr. R. S. Ingram, architect, provided the plans, and the contract was undertaken by ex-Bailie Calderwood. The entire cost is about 1,200*l.*

Deaf and Dumb Schools, Preston.—The foundation-stone of the North and East Lancashire Deaf and Dumb Schools, Preston, was laid on the 1st inst. by the Earl of Lathom. The building will provide accommodation for fifty children. There is provided on the westerly side a boys' wing, with a day-room 23½ ft. by 18, teachers' rooms being placed at either end. In the event of extension these latter will be removed, and the length of the room will then be 36 ft. Dormitories are arranged with bathrooms, &c. A wing for the girls is placed at the east side of the buildings. The governor's residence is placed in the centre of the buildings, and there is also a board-room, together with a sick ward and a block where the administrative work of the schools will be carried on. The plans have been prepared by Messrs. Somes & Green, architects, of Blackburn, and the present cost of the work is estimated at 5,200*l.*

Technical Schools, Ashton-under-Lyne.—On the 3rd inst. the new technical schools and free library, which have just been completed for Ashton-under-Lyne, were opened. The building is in the Early English style, and has been erected from designs prepared by Messrs. John Eaton & Sons, architects, Ashton, at a cost (including fittings) of 16,000*l.* In the free library section provision has been made for accommodating the 13,000 volumes which constitute the present library at the Town-hall, for a general reading-room, reference library and reading-room, and ladies' reading-room. The whole of the first floor (over the library), which is devoted to art, is divided into class-rooms, so arranged round a central gallery that when required for the purposes of an art exhibition, which it is intended to hold occasionally, it would be possible to complete the circuit of rooms without going out of the gallery.

Technical School, Salford.—On the 1st inst. the foundation-stone of a school for providing technical instruction in Salford was laid by Mr. Alderman B. Robinson, ex-Mayor of the Borough and chairman of the Technical Instruction Committee. The building, which is estimated to cost about 50,000*l.*, is being erected at the south-west extremity of Peel Park, and is set back a short distance from the street, stretching its main front northwards in the park for more than 300 ft. It is being executed in red brick and terra-cotta, and will rise 80 ft. or 90 ft. from the ground. The various class and lecture rooms will accommodate 2,200 students. In addition to these, a large room, seating about 600 persons, is provided behind the main building, but close to the central entrance. This will be made use of for popular scientific lectures and entertainments, and for musical performances. The building will comprise the various rooms necessary for the teaching of physics, mechanics, engineering, and the handicrafts associated with it; joinery, turnery, wood-working, plumbing, building construction, engineering, drawing, modelling, freehand drawing and painting, &c. Dining, day rooms, and library will be provided for the use of the students, and provision made for the various secretaries, committees, and teachers. Mr. Henry Lord, of Manchester, is the architect, and the foundations are being put in by Messrs. Wilson & Toft, builders, also of Manchester. The warming and ventilation of the building will be by the Blackman-Smead method.

School of Art, Carmarthen.—On the 22nd ult. a new school of art was opened at Carmarthen. The new building is in the modern Renaissance style, and faces the westerly entrance to St. Peter's Church, in Church-lane. It is built of red Bridgwater bricks, the mouldings and cornices being of Ruabon bricks, and the dressings of Bath stone. Accommodation is provided for seventy pupils. Entering through a hall, laid with tesselated tiles, and divided by an arcade supported by fluted and moulded pilasters, an elementary room, 37 ft. by 20 ft., and a modelling-room, 18 ft. 6 in. by 19 ft., are reached on the ground-floor. The rooms are about 16 ft. high. Lavatories for the boys open from the hall. The landing has pilasters and arches corresponding with those in the entrance-hall. The upper floor contains a room 37 ft. by 20 ft., and a master's room, 18 ft. by 12 ft. The former will be divided by a curtain or moveable partition, and the divisions will be used as painting and antique room respectively. On the upper floor there are also lavatories and a ladies' cloak-room. Artificial light is provided by pendants from the ceiling having Wenham lights. The work has been carried out by contract by Mr. T. Morris, Carmarthen, from the designs and under the superintendence of Messrs. G. Morgan & Son, architects, also of Carmarthen.

Monastery, Glasgow.—The new monastery or retreat which has been erected in Parson-street, Glasgow, for the Passionist Fathers, was opened on the 25th ult., by Archbishop Eyre. Adjoining the church, and built in Gothic style, with a red sandstone front, the monastery consists of four stories, and contains numerous apartments. Accommodation has been found on the basement for a parish library, and the first floor contains a library for the use of the clergy, a refectory, a community-room, and three public reception-rooms. On the second and third floors are sixteen bedrooms, and on the third flat is also built an oratory. The building has been designed by the Rev. Father Osmund Cook, of Paris, and has cost 4,000*l.*

New Church, Bangor.—On the 22nd ult. the Bishop of Bangor dedicated the newly-erected Church of St. Cross, situated at Maes-y-groes, Llanllechid, near Bangor. The church and site, costing about 3,000*l.*, are the gift of Lord Penrhyn. The church is built from the designs of Mr. T. D. Atkinson, Cambridge, by Mr. Owen Morris, Carnarvon, and Mr. Newling, of the Penrhyn Estate. It consists of nave, chancel, vestry, and porch, and is built of Anglesey limestone, in the Norman Twelfth-century style. It is seated for 200 people.

Church Fittings, St. Michael's, Bournemouth.—New carved oak choir stalls, executed by Mr. J. Sharp, of Westbourne, and a wrought iron-screen and gate to chancel of St. Michael's Church, Bournemouth, executed by Messrs. Singer, of Frome, were used for the first time on St. Michael's Day. They have been made from designs by Mr. Reginald G. Pinder, F.R.I.B.A.

SANITARY AND ENGINEERING NEWS.

The Worshipful Company of Plumbers.—At the quarterly meeting of the Court held at Guildhall on the 30th ult. the following officers were severally sworn into office for the year ensuing:—Master, Mr. Alderman Stuart Knill (Lord Mayor Elect); Warden, Mr. W. H. Bishop; Renter-Warden, Sir Philip Magnus, B.A., B.Sc.

Proposed Waterworks Extensions, Leeds.—On the 4th inst. Mr. Thomas Codrington, one of the Inspectors of the Local Government Board, opened an inquiry at the Leeds Town Hall with reference to an application by the Leeds Borough County Council for sanction to borrow 131,600*l.*, of which 100,000*l.* is required for waterworks extensions and 31,600*l.* for general improvements. The Town Clerk (Mr. J. Harrison), in laying before the Inspector the reasons for the application, stated that in February, 1890, Mr. Codrington held an inquiry upon the application of the Corporation for sanction to borrow, among other moneys, a sum of 200,000*l.* for waterworks purposes authorised by the Provisional Order of 1888. It was afterwards considered that it would be sufficient to apply for 100,000*l.* only, and upon the Inspector's report the necessary sanction of the Local Government Board to the borrowing of that amount was granted. Sanction was now sought for the borrowing of the remaining 100,000*l.* The

Corporation had provided a system of waterworks, but the consumption of water had so largely increased that further works were necessary. In 1881 there was an average daily consumption of 7,858,000 gallons, whilst in 1891 it had reached 12,946,000 gallons. The 100,000*l.* which it was now sought to borrow was intended to be applied in the ordinary and necessary extension of mains arising out of the increased demand for water, in the extension of the Eccup Reservoir, and reconstruction of the embankment, in the extension of the reservoir at Moortown, in providing a new service-reservoir at Harehills, and in other necessary and consequential works. With regard to the 31,600*l.* required for general improvements, the money would be needed for the purchase of land, the payment of compensation and costs for buildings, drainage, flagging, and paving, and sewering in different parts of the borough.—The Borough Surveyor (Mr. T. Hewson) explained in detail the various works in respect of which the present application was made.—The Inspector afterwards dealt with the details of the proposed improvements. He will report in the usual course.

Loughton Sewage Works. — On the 28th ult., the members of the Epping Rural Sanitary Authority, together with the Loughton Sanitary Committee, and representatives from Buckhurst Hill, Woodford, and the neighbourhood, met at the Loughton Sewage Works to examine the International process of sewage purification there at work. Mr. Egan, the Engineer to the Epping Rural Sanitary Authority, in explaining the works to the company assembled, stated that the sewering of Loughton was commenced in 1879, when 5 acres of land were purchased, upon which the sewage, after deposition of the grosser solids in tanks, was allowed to flow for the purpose of intermittent filtration. The land was underdrained, and the sewage from the settling-tanks passed through it. This answered fairly well for a time, but ultimately the effluent from the land became most unsatisfactory, and other steps had to be taken to prevent pollution. In 1888 it was resolved to improve this state of affairs, and also to extend the sewerage system to the northern part of Loughton, and after many schemes of sewage purification had been considered, it was decided to adopt the use of ferozone for precipitation, followed by filtration through polarite beds, instead of buying more land, especially as the land treatment had altogether failed. The entire scheme includes about 16,000 yards of sewers, and storm-water drains, the raising of about 280 yards of the original outfall sewer, eight automatic flushing-tanks, and the necessary man-holes, lamp-holes, and ventilating columns. The total cost of the drainage scheme and sewage purification works, including the land, was under 14,000*l.* The present population is about 5,000, but the purification works are stated to be capable of dealing with the sewage of a much larger population. The Chairman of the Epping R.S.A. (Mr. G. Johnson), in speaking of what they had that day seen, remarked that when the process was first proposed for Loughton, he was very sceptical about it, and it was mainly due to his instrumentality that a sand and gravel filter was laid, for the purpose of comparing the effluent from the polarite filters. He was, however, very pleased to be able to tell them that the International process had proved a great success, and that they were about to convert the sand filter into a polarite one, being convinced of the immense superiority of polarite over sand, and that the use of polarite was real economy in the end. Mr. Egan, the Engineer, confirmed the remarks of the Chairman, and said he was convinced that in adopting this process, they had at a small outlay secured the best system of sewage purification.

New Waterworks, Highclere Park, Newbury. —The waterworks on the estate of the Earl of Carnarvon at Highclere Park, which have been in process of construction for some time, were put to a practical test on the 23rd ult., particularly as regards their efficiency in case of fire, and for this purpose the Newbury Volunteer Fire Brigade attended with their steamer. The works have been designed and carried out by Mr. Richard Ravenor, of Newbury. The pumping station is about two miles from the reservoir, and the water supply is obtained from springs and collected into an underground tank, and from thence into one above ground, and it is from the latter that the power for working the hydraulic ram is obtained. The ram is worked on the continuous flow principle, and will supply the Castle, stables, and flower-gardens, as well as the dairy and the home farm. The reservoir, which is on Siddown (or Siddon) Hill, is capable of holding 125,000 gallons, and its height above the ram is 400 ft., and above the flagstaff tower of the castle 30 ft. It is constructed of concrete, and has a flat covering of the same material. A fire-main connected with this reservoir is laid completely round the exterior of the castle, and hydrants are placed so as to connect the hose in case of fire. A fire-main runs up through the centre of the building inside, with hydrants on each floor, and 60 ft. of hose, with branch pipe attached to each. The water is forced through two miles of rising main from the ram to the reservoir.

STAINED GLASS AND DECORATION.

Memorial Window, Ingrow Church, Yorkshire.—A large stained-glass window has just been placed in Ingrow Church, to the memory of the late Mr. John Wright and his wife, by three of their children. The window illustrates the Good Shepherd, the Good Samaritan, and the Lost Piece of Silver, placed in the upper, middle, and lower spaces respectively. Each subject is surmounted by canopy work. The window is from the studio of Messrs. Powell Brothers, of Leeds.

Memorial to the Late Dr. Lightfoot.—It has now been definitely decided that the first portion of the memorial to the late Dr. Lightfoot, who died in December, 1889, shall be unveiled in Durham Cathedral on October 20. The memorial includes a recumbent effigy of his Lordship to be placed in the chancel of the Cathedral at Durham; and, in addition, the restoration of the Chapter-house of the Cathedral. The cenotaph will be unveiled by the Earl of Durham, the Lord-Lieutenant of the county. The effigy of his Lordship was partially executed by the late Sir Edgar Boehm, who died whilst the work was in progress, and its completion has been intrusted to Mr. Alfred Gilbert, A.R.A.

Memorial Windows, St. Brycedale Church, Kirkcaldy.—Three memorial windows have just been added to St. Brycedale Church, Kirkcaldy. The first commemorates Patrick Don Swan, for many years Provost of the town. The design is by Mr. Burne-Jones, and it has been executed at the works of Mr. Morris. Incidents in the life of Moses furnish the theme of both compartments. The opening next this in the church is a memorial lately finished of Provost Beveridge. The subject is Christ pointing out Nathaniel to the two disciples as the Israelite without guile. The third window is in memory of Mrs. Stocks, a member of the congregation.

FOREIGN AND COLONIAL.

France.—Seven years ago the State bought the Hôtel de Chimay, on the Quay Malaquais, with a view to enlarging the École Nationale des Beaux-Arts. Now the alterations are nearly complete, and the Administration des Beaux-Arts hopes to be able to open them at the end of the month.——It is announced that the celebrated Spitzer collection is to be sold next April and May. The auction, which will be held in the hotel in which the collector lived, will be preceded by an exhibition, the proceeds of which ought to be reserved for the benefit of the future treasuries of museums. ——M. Nénot, architect of the Sorbonne, is about to demolish a part of the old buildings which line the Rue St. Jacques, where the façade of the new buildings is to be placed. In order that the scientific work of the Faculté shall not be interrupted a large amphitheatre is to be built in the large Court of Honour. It will be 18 mètres wide and 15 mètres long, and will be made entirely of iron and bricks. ——At the Musée Guimet an interesting collection has lately been inaugurated. It consists of documents collected by M. Jacques de Morgan, Director of Egyptian excavations, during his late archæological mission in Armenia and Persia. This exhibition comprises some curious specimens, from the time of the Stone Age to the time of Persian mosaics executed in the sixteenth century.——After an interruption of three months, the work of transformation in the Butte Montmarte has again been taken up. The grotto and the artificial rocks are finished, and a bridge is being made over the little torrent, which rises at the head of the square. The gardeners have begun to design the alleys of the garden, which will be one of the curiosities of Paris.——A project is on hand to take the Seine water below Carrage d'Ablon, and convey it by underground reservoirs to the Place d'Italie.—— The great clock of Rouen has lately been restored, the dial-plates have been decorated with a polychrome ornamentation similar to what they had in 1529, with allegorical cars and personages in gold and colours. This curious restoration of sixteenth-century work has been carefully done by M. Sauvageot. The strengthening of the arch and the rebuilding of a little house at the foot of the tower, known as the "Loggia," are now being carried on. The work was begun in 1890.——The work of turning the waters of the Avre and Vigne into Paris is now well advanced. The waters enter the Department of the Seine through a tunnel in the side of St. Cloud, and they empty themselves in front of a grille in the Bois de Boulogne. Here they are carried above the Seine by a bridge with an inclined floor, the piles of which are now finished. The foot-bridge for pedestrians, above this bridge, will probably be ready in about two months.—— The Compagnie du Chemin de l'Est are building a monumental station at Pantin, near the new Mairie. It consists of a central pavilion, 50 mètres long, flanked by two aisles. This station will be opened in March.——In order to minimise the danger arising from the fires in cellars, and to facilitate the prompt discovery of the locality of the fire, the Préfet de Police has asked all householders to leave with their concierges an exact plan of their cellars and basements, which, in case of fire, can be given to the firemen.——M. Bourgeois, Minister of Public Instruction, last Sunday presided at the inauguration of the statue of the composer Méhul, on the Place de la Ville at Givet (Ardennes).——On October 1 a new line of railway was opened in Corsica from Vizzanova to Vivario. ——The death of M. Georges Guerin, artist, painter, and sculptor, is announced. He was a pupil of M. Yon, and painted still life.

MISCELLANEOUS.

Rubber Studs for Floors, Stairs, &c.—Messrs. David Moseley & Sons, of Manchester, send us specimens of their new rubber stud. This consists of a small iron plate with nail points projecting from the under surface, around which india-rubber is moulded and vulcanised, leaving the nails projecting through it. The result is a rubber stud about an inch square and ¼ inch thick, with bevelled edges, which can be fixed at once into wood by one sharp blow of a hammer, the nail points forming a sufficient fixing. It is proposed by the makers that these should be used for fixing into floors or stairs when it is desired to combine noiselessness with a firm foothold. For a large area we imagine the labour of setting and fixing so many would be more than the result is worth. For wooden stairs they may be useful, and they have the advantage that if studs in one place are more worn than the others, they can be taken out and replaced without disturbing the remainder. The makers advertise also smaller circular studs on the same principle, for fixing into boot-soles.

A New Portable Scaffold.—We have had an opportunity this week of seeing in action, in front of the shop of Mr. Shingleton, blind-maker, High-street, Kensington, a new portable scaffold, which consists essentially of a telescopic central leg or support, up or down which a small platform, with room for two men to stand, is moved by mechanical means. The vertical support of the scaffold is provided at its upper end with strong irons provided with small wheels for bearing against the wall of the building, so as to facilitate its movement along a frontage. It is secured by ropes round chimney-stacks or other objects, much in the same way as ladders are secured. The apparatus did not work very smoothly at the time of our visit, owing, it was said, to the warping of some of the woodwork, but there is something in the idea, and the scaffold may be found very suitable for painters and others needing a light and easily shifted temporary staging for work in front of houses. We understand that the invention is a foreign one, and that provisional protection has been obtained for it at the Patent Office.

King's College, London.—In the Division of Public Health arrangements have been made for systematic instruction in hygiene and on the various subjects embraced within the duties of sanitary officers. A course of lectures will be given by Professor Banister Fletcher, on Building Construction, a course by Dr. Allan on General Duties of Sanitary Inspectors, and a course by Professor W. R. Smith on "Physics and Chemistry in Relation to Sanitary Science."

Aldgate Pump.—At last week's meeting of the City Commissioners of Sewers it was announced that an electric light is to be placed on Aldgate Pump: thus a time-honoured landmark enters upon a new stage in its career. The pump,—now served, we believe, by the New River Company,—marks the sites of the buried chapel, or crypt, of St. Michael's, and a house occupied by Stow, who says: — "The principal street of this ward [Aldgate] beginneth at Aldgate stretching west to sometime a fair well, where now a pump is placed." He tells us how the bailiff of Romford was brought by the sheriff's order to the well within Aldgate for execution of sentence, and was killed "upon the pavement of my door where I then kept house." Strype recounts that he found Stow, in 1549, dwelling by the well where now a pump stands, between Leadenhall and Fenchurch streets. Stow seems to have been unaware that a few feet north-west of the pump lay the buried crypt of St. Michael's, of which, whilst commonly stated to have been re-discovered in 1789, Ducarel had a drawing dated "1754." Views of the interior will be found in the *Gentleman's Magazine*, April, 1789, and, with a plan, in Wilkinson's *Londina Illustrata*, vol. i. Extending 46 ft. north to south, by 17 ft. east to west, and having two aisles divided into three bays, vaulted with pointed arches, it is said to be the work of Norman, who in 1108 became prior of Queen Matilda's Christ Church, in the parishes of St. Mary Magdalen, St Michael, St. Katharine, and the Blessed Trinity, formed into one parish,—Holy Trinity by Aldgate, which priory, as rebuilt, Margaret, daughter and heir of Sir Thomas Audley, Lord Chancellor, brought in marriage to Thomas, fourth Duke of Norfolk.* The ground within the crypt rose to 3 ft. or 4 ft. below the capitals of the columns, and the road, outside, to perhaps 25 ft. above its original level. The walls are described as being made of squared blocks of chalk, the arches and groining of stone. The crypt was destroyed, we are informed, about twenty years ago.

* The gateway was illustrated in Mr. Birch's "Old London," at the Exhibition of 18

COMPETITION, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITION.

Nature of Work.	By whom Advertised.	Premium.	Designs to be delivered.
*County Buildings	Anglesey C. C.	.....	No date

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Construction of Sewer	Cheshunt Local Board	*Official*	Oct. 11
*Roadmaking and Paving Works	Willesden Local Board	O. Claude Robson	do.
Excavation Work	Halifax Corporation	E. R. S. Escott	do.
Stable and Cart Shed, Stoney Royd	do.	do.	do.
Pipe Sewer	do.	do.	Oct. 12
*Road Paving Works	Vestry of Mile End Old Town	J. M. Knight	do.
*Fire Escape, Staircase, &c.	West Ham Union	F. J. Sturdy	do.
Streets Improvements	Ystradyfodwg Loc. Bd.	J. W. Jones	Oct. 13
Sewage Disposal Works	Keighley Corporation	W. H. Hopkinson	Oct. 14
Leaden Water Pipes	Plymouth Corp.	E. Sandeman	do.
Additions, &c. "Boat of Garten," Hotel, Elgin, N.B.	Geo. Grant	..	Oct. 15
Episcopal Church, Grantown, N.B.	....	Ross & Macbeth	do.
Wesleyan Church, Barnard Castle	.....	Morley & Woodhouse	do.
*Wrought-iron Unclimbable Fencing	Headon Local Board	S. S. Grimley	do.
*Roads and Sewers	Edmonton Freehold Land, &c. Co. Lim.	H. W. Dobb	Oct. 17
*Paving Roads, &c.	Islington Vestry	*Official*	do.
*Roadmaking	do.	do.	do.
*Patent Victoria Stone Paving and Kerb, &c.	Romford Local Board	do.	do.

CONTRACTS.—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Repairing Roads, Supply of Stores, and Drain Pipes	Croydon Town Council	*Official*	Oct. 18
*Hall and Reading Rooms, Blaengarw	The Committee	Jacob Rees	do.
*Draining Proposed Market, Kew Bridge	Brentford Local Board	J. H. Strachan	do.
*Construction of Concrete Culvert	Tottenham Local Bd.	J. E. Worth	do.
*Isolation Ward, &c. Feltham Industrial School	London County Council	*Official*	do.
*Supply of Stores	Richmond Main Sewerage Board	W. Fairley	Oct. 19
Infectious Diseases Hospital, Canton, Cardiff	Cardiff Corporation	W. Harpur	Oct. 24
*Warming of School at Islington	School Bd. for London	*Official*	do.
*Widening Portion of Cornwall Line	Gt. Western Railway	do.	Oct. 26
*School at Bridgend	Technical and Intermediate School Com.	G. F. Lambert	Oct. 31
*Woodwork, &c. of Pavilion	Clacton-on-Sea Pier Co. Lim.	Kinipple & Jaffrey	Nov. 1
Block of Buildings, Tredegar-p'ace, Newport, Mon.	S. Smith	Habershon & Fawckner	No date
Business Premises, Cardiff	John James & Co.	Seward & Thomas	do.
Pumping Station Work	Leeds Corporation	*Official*	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Clerk of Works	Manchester School Bd.	.....	Oct. 8
*Draughtsman	Leicester Corp.	2*l.* 2s. per week	Oct. 13
*Surveyor and Inspector of Nuisances	Leominster T. C.	100*l.*	Oct. 19
*Surveyor's Assistant	Grimsby T. C.	120*l.*	Oct. 24

Those marked with an Asterisk (*) are advertised in this Number. *Competition, p.* iv. *Contracts, pp.* iv., vi., *&* viii. *Public Appointments, p.* xx. *&* xxi.

Clock, Great Salkeld, Penrith.—At the parish church of Great Salkeld a new Cambridge quarter clock, showing the time upon one external skeleton dial, 4 ft. 6 in. diameter, with copper hands, and balanced within, has just been erected. The clock is constructed on the solid horizontal cast-iron bed-frame, the top surface planed perfectly flat; the frame rests upon strong iron brackets let into the wall of the tower, thus giving a firm foundation. All the bushes are of gun-metal, screwed separately into the frame to enable any part of the clock to be detached without disturbing the other parts. There are three separate trains of wheels,—viz., going part, striking part for the hours, and striking part for the chimes. The going part main-wheel is of large size, with maintaining power attached for the purpose of keeping the clock going during the time of winding. The escapement is the double three-legged gravity by Lord Grimthorpe, with a compensation pendulum. The main-wheel of the striking part for the hours is of large size, with cams fixed for bringing out the full tone of a tenor bell of 13 cwt. The main-wheel of the Great St. Mary of Cambridge chimes has cams attached for lifting the hammers for striking the correct musical quarters. There is also an apparatus for pulling off all hammers during the time of ringing the bells for service. The makers are Messrs. William Potts & Sons, of Leeds.

The English Iron Trade.—The English iron-market shows little change, although in several districts slight signs of general improvement are manifested. There is, however, more activity noticeable in the steel-rail trade, and an order for from 30,000 to 40,000 tons of rails and accessories has been secured by the Ebbw Vale Iron and Steel Company. The Glasgow warrant-market is firmer, and Scotch makers' iron is in fairly active inquiry. In Cleveland, pig-iron is depressed. The iron-masters' returns for September show an increase in stocks of 7,024 tons. The production is large, 217,000 tons, of which nearly half is hematite iron. The total stocks on hand are 53,000 tons, including warrants. There are ninety furnaces blowing, the highest number this year, fifty being on Cleveland iron, and forty on other kinds. Trade in the north-west of England continues dull. In manufactured iron, increased orders are reported from the Midland districts, and enhanced prices are secured, but generally the demand is limited. Little alteration is noted in the steel trade, and in ship-building and engineering matters continue quiet. The coal trade is fairly steady.—*Iron.*

Addition to Screen, Lustleigh Church, Devonshire.—An addition has been made to the screen of Lustleigh Church as a thankoffering from a parishioner. The parclose screen has also been restored in the chancel. Both works have been carried out by Mr. Herbert Read, of Exeter, under the direction of Messrs. Fulford, Tait, and Harvey.

Antiquarian Discoveries in Cumberland.—On the 20th ult. the Cumberland and Westmoreland Antiquarian and Archæological Society visited Hardknott Castle, in Eskdale, Cumberland, and examined the discoveries which have been made as the result of excavations carried out by the President (Mr. Ferguson, F.S.A.), the Rev. W. S. Calverley, F.S.A., and Mr. C. W. Dymond, F.S.A. What is known as Hardknott Castle was a Roman quadrangular fort built of stone, provided with gates, and having a tower at each angle. The President, in a paper upon the fort, described the ruins. What was now called the bowling-green was the parade ground. The camp covered between three and four acres. The south-western gateway was covered by a natural mound or traverse of rock, the gate itself being probably double. The north-west gate was a single gate, the total opening, 10 ft., being about only half that of the other three gates. The north-east gate was a double gate, and was 19 ft. 7 in. in the opening. He had no doubt it was a *fac simile* of the south-western gate. The north tower stood on a huge rocky knoll, and occupied much the highest part of the camp. The towers consisted of a basement of stone, probably used as storehouses. The forum had been cleared out sufficiently for the whole plan of it to be discovered; the eastern group of buildings comprised the barracks; and the western group contained what he conjectured to be a stable with harness-room. No prætorium had been found, and it was probable that the officer in command of the camp was not above the rank of a centurion. Outside the camp, near to the road, Mr. Calverley had unearthed a circular building, 15 ft. internal diameter, still standing about 4 ft. high. It was, there was little doubt, a temple, and contained the image of some god or goddess, patron of travellers. Mr. Calverley had also found the ruins of a three-roomed house with an elaborate system of hypocausts, and also a bath. He (the President) conjectured that this was a way-side tavern for the refreshment of travellers.

Surveyorship Appointment.—Mr. M. Petree, the Assistant Surveyor of Great Grimsby, has been unanimously appointed Borough Surveyor, in place of Mr. J. Buchan, who has received the appointment of City Engineer of Norwich.

Land at Willesden.—A portion of the Willesden Park Estate was, we are informed, sold by Messrs. Baker & Sons on Wednesday, sixty plots of building land realising 3,200*l.*, at the rate of 1,850*l.* per acre. The growth of this London suburb is marvellous, the population during the last decade having trebled.

Lectures on Hygiene.—Mr. Edward Tidman has just been appointed Lecturer on Hygiene, and commences a course of lectures on October 13, at Cheshunt, Herts, for the Cheshunt Technical Education Committee.

MEETINGS.

Monday, October 10.

Clerks of Works' Association (*Carpenters' Hall*).—Monthly Meeting. 8 p.m.

Tuesday, October 11.

Sanitary Institute (*Lectures for Sanitary Officers*).—Dr. Louis Parkes on "Water Supply, Drinking Water, Pollution of Water." 8 p.m.

Friday, October 14.

Sanitary Institute (*Lectures for Sanitary Officers*).—Mr. W. C. Tyndale on "House Drainage." 8 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

16,446.—Cowls: *W. F. Young.*—This patent refers to an improved ventilating cowl intended for creating an upcast draught in pipes, flues, &c. Above a circular pipe there is provided a series of truncated cones, each having openings towards the top of the pipe. These cones are mounted one upon the other by means of projecting bearers, the uppermost cone being provided with a cros-bar perforated in the centre, below which is a tube receiving the spindle of a revolving cowl-head. This cowl-head is formed from one piece of sheet metal cut out in six or more radiating portions, which are bent downwards to form a series of baffles to catch the wind, by the agency of which the head of the cowl revolves. The bottom of each baffler is firmly secured to an iron rim, which tends to strengthen the whole of the cowl-head. The spindle upon which the cowl-head revolves passes through the top of the sheet-metal portion, and is secured thereon by a screw-nut. The bottom of the spindle is of a conical shape, and bears upon the bottom of the tube before mentioned.

17,863.—Water Closets: *J. Day.*—This patent refers to what is described as an improved water-closet for utilising waste water. The object of the invention is the construction of a water-closet in which the excremental matter is received into water contained in a bowl supplied by the waste water from the sink, bath, or other source, and the contents of which are automatically discharged into a container, from which they pass out through a trap into the drain. This container communicates at the bottom with a trap, and has pivotted within it a tilting-bowl, shaped so that when empty, or only partially filled with water, it is heavier on one side of the pivot centre than on the other, the heavier side balancing up the opposite side against a suitable stop; but when the bowl is full the opposite side is heavier, and tilts the bowl over to discharge the contents into the container, and from thence through the trap. Immediately the contents have been discharged the bowl balances itself up again into its normal position for receiving a fresh charge.

17,881.—Bricks: *C. H. Shoppee.*—The object of this invention is to provide a brick to supersede ordinary bricks for vaulting and arching, where either a circular or flat soffit is required, so as to avoid weight and the thrust which arises when ordinary bricks are used. The brick is made of the form of an ordinary brick which has been cut away at the back along its two sides so as to leave a dove-tail projection standing out from the front or face portion of the brick, which remains unaltered. This dove-tail projection may be made to run from one end of the brick to the other, or one of the ends may be left solid and not cut away, so that the bricks may be used for coursing or ranging with other brickwork. The front face, or the front face and end, may be glazed or unglazed as desired. The web of the dove-tail may have perforations formed crosswise through it, so as to give an opportunity of inserting cramps or bonders, when the dove-tail bricks are used instead of tiles, &c., for facing up old walls vertically. In using the bricks for making a segmental arch or flat soffit the bricks would be united together by a concrete backing, the spaces between the dove-tail projections at the back of the bricks being filled in with fine cement and breeze, or with ordinary cement concrete.

6,261.—Window Sashes: *P. Schmahl.*—This invention has for its object to obviate the drawbacks incidental to opening and closing windows situated at a considerable height above the floor level, and to enable the window to be opened either at the top or bottom as desired, so that hot air can escape from the room or cold air be admitted. For details of the invention we must refer our readers to the specification and drawings.

12,174.—Artificial Stone: *O. Terp.*—This invention relates to an artificial stone having the same qualities, such as durability, resistance to atmospheric and other outward influences, and presenting the same appearance as natural stones, but with greater hardness. The inventor produces a chloride solution, consisting of chloride of calcium, chloride of magnesium chlorated water, hydrochloric acid and water, as described in the specification. This solution is intimately mixed with what is known in Germany as bitter earth, with pigments if desired, and with sand, quartz, peat, or peat-fibre, paper pulp, spent tan, or other materials, to make up bulk, according to the material to be manufactured. The hardness of the stone or composition can be made more or less by the addition of hydrochloric acid. This composition can be used as artificial sandstone, veined or other marbles, mosaics, moulds for plaster of Paris, cement castings, pavement-flags, stair-steps, &c.

12,175.—Paints: *O. Terp.*—This refers to an application of the chloride solution named in the foregoing specification for coating surfaces, and giving them an enamel character.

12,539.—Ventilation: *H. A. Poole.*—This specification relates to improvements in the method and apparatus for ventilating public buildings, dwelling-houses, greenhouses, stables, &c., and the like, and the object is to provide a simple and effective method and apparatus whereby the windows can be automatically and gradually opened or closed in accordance with the rise and fall of the temperature of the atmosphere, and thereby fresh or cool air be admitted or excluded. The improvements consist in utilising the atmosphere for the expansion of a volume of confined atmospheric or compressed air or gases generated by liquid, and causing such air or gas, in connexion with suitable mediums, to

operate the window or windows of buildings or other structures.

NEW APPLICATIONS FOR LETTERS PATENT.

September 19.—16,685, T. Thorp, Flushing Closets, Drains, &c., with Waste-water.—16,703, W. McNeill, Combined Rule and Square.—16,717, J. Bloomfield, Plaster.—16,736, A. Cruickshank, Chipping Tool.

September 20.—16,752, J. Conley and J. Wolfe, Brick Kilns.—16,755, J. Bishop, Ventilation of Houses, &c.—16,782, C. Stockwell, Flushing Apparatus for Water-closets, &c.—16,785, A. Jarrard, Hinge.—16,807, W. Goold, Slide Rules, &c.—16,818, W. Knightly, Drain, Gas, Water, and other Pipes, and joining same.

September 21.—16,848, J. Rostron and J. Hilton, Imitation Tiles suitable for Hearths, Grates, Floors, &c.—16,880, A. Mears, Planing or Shooting Mitres.

September 22.—16,913, F. Moore, Nails and Screws.—16,914, E. Tilston, Water-waste Preventing Syphon Cisterns.

September 23.—16 972, R. Taylor, Hydrostatic Lifting Jacks.—16,997, T. R. and R. Usher, Electric Bells.—16,999, C. Harrison, Preventing the Bursting of Water Pipes by Freezing.—17,011, W. Mihill, Granite Hammers.—17,014, J. Reekie, Fixing Water-closets. — 17,016, J. Jones and P. Hoy, Testing Drains.

September 24.—17,046. C. Manchip and R. Foley, Roofing Tiles.—17,073, R. Rigby, Graining Comb.—17,074, G. Law, Kerb Stones.

PROVISIONAL SPECIFICATIONS ACCEPTED.

12,012, S. Spratt and F. Bailey, Pipe-subway.—14,085, F. Hubber, Baths and Cisterns therefor. — 14,565, G. Glasson, Sash or Bench-cramp for Joiners, &c.—14,910, G. Rose, Ventilation.—15,003, J. Waddington and J. Pendlebury, Retaining Windows or Doors in any desired position.—15,018, E. Partridge, Scaffold and Means for Attaching Came to a Ladder.—15,105, J. Löhmer, Flue Connector for Chimney Shafts.—15,142, G. Sturte, Raising, Lowering, and Fastening Window Sashes.—15,221, J. Sellars, Portland or Equivalent Cement Mouldings, Castings, Blocks, &c.—15,279, W. Richardson, Draught Exciuder for Doors.—15,299, J. Goring, Electric Apparatus for Operating the Unfastening and Fastening of Doors,—15,473, J. Craig and R. Highet, Syphon Discharge Cisterns.—15,562, G. Gent, Disinfecting Means for Water-closets, Drain-pipes, &c.—15,621, A. Jones, Window-sash Fasteners.—15,626, W. Glazier and J. Malam, Hinges for Folding-doors, &c.—15,661, R. Cochrane, Mosaic, Parquetry, and similar Ornamental Work.—15,770, E. Hargreaves and others, Gulleys and Traps for Sanitary Purposes.—15,794, R. Howard and others, Self-closing Regulating Valves for the Admission of Water to Water-closets, &c.—15,920, N. Wilson, Grates for Open Fireplaces.—16,064, G. Jennings and J. Morley, Supplying Water to Closets and other Places.—16,119, F. Perry, Water-waste Preventers for Flushing Purposes.—16,121, M. Demez, Veneering Wood.—16,165, W. Dean, Plasterers' Laths for Ceilings, Walls, or similar Structures.—16,174, P. Bramwell, Fastener for Window-sashes, &c.—16,180, J. Horsford, Window-sash or like Fastening.—16,183, H. Rougier, Coupling Device applicable as a Window Fastener, &c.—16,321, R. Kelly, Hand-power Tenoning Machine for Wood-working.—16,341, T. Canik, Sewer Ventilators.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

16,843, J. Kaye, Actuating Exit Doors.—19,740, G. Jackson, Constructing Concrete Buildings.—9,115, A. Boult, Skylights.—14,794, G. Coleman, Whitelead and other Lead Pigments.—14,917, T. & C. Tildesley, Door Knobs.—15,147, J. Keseling and C. Fuchs, junior, Artificial Stone.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

SEPTEMBER 17.—By *Humbert, Son, & Flint* (at Chester): "Stoke Farm," Stoke, Cheshire, 62a. 1r. 37p., f., 2,510*l.*

SEPTEMBER 26.—By *Simmons & Sons*: "Hill Farm," and 117a. 2r. 13p., f. and c., Hare Hatch, Berks, 5,250*l.*; An enclosure of f. land, about 11 acres, 700*l.*; three f. cottages, 450*l.*; Freehold meadow land, 4a. 2r. 30p., Wargrave, 600*l.*

SEPTEMBER 27.—By *A. G. Thomson & Co.*: 30, 32, and 36, Bucharest-rd., Wandsworth, u.t. 96 yrs., g.r. 16*l.* 10s., 450*l.*; 20, Craster-rd., Brixton, u.t. 84 yrs., g.r. 7*l.* 10s., r. 37*l.* 10s., 285*l.*; 1 to 9 (odd), Grove-av., Walham Green, u.t. 70 yrs., g.r. 25*l.*, 700*l.*; 11 to 29 (odd), Grove-av., u.t. 70 yrs., g.r. 50 yrs., 1,400*l.*—By *F. J. Bisley & Sons*: 37, 46, and 48, Ansty-st., Rotherhithe, f., r. 48*l.* 2s., 330*l.*; 15 to 18, Staple's Rents, u.t. 1,000 yrs., g.r. 5*l.*, 190*l.*; 11, Reverdy-rd., u.t. 46 yrs., g.r. 4*l.* 10s., 335*l.*—By *B. Brown*: 206, 208, 212 to 218 (even), West Ferry-rd., Millwall, u.t. 24 yrs., g.r. 6*l.*, 160*l.*; No. 183, Bow-rd., f., sold before auction; f.g.r. of 11*l.*, Canton-st., Poplar, reversion in 38 yrs., 410*l.*; 56, Canton-st. and yard, f., r. 78*l.*, 800*l.*; 1 and 2, Canton-buildings, f., r. 54*l.* 12s., 600*l.*; 35, 37, and 39, Canton-st., f., r. 97*l.*, 1,170*l.*; 32, 34, and 36, Gough-st., u.t. 39 yrs., g.r. 7*l.* 10s., 620*l.*—By *A. Chancellor*: 4, Chislehurst-rd., Richmond, u.t. 80 yrs., g.r. 6*l.*, 790*l.*; "The Horse and Groom" public-house, Bracknell, Berks, f. and c., 1,960*l.*; "The Blue Lion Inn," f., r. 40*l.*, 1,300*l.*—By *Messrs. Cobb*: enclosures of f. land, 8a. 3r. 6p., Luton, near Chatham, 550*l.*

SEPTEMBER 28.—By *Sales & Wiltshire*: 3, George-lane, Lewisham, f., r. 23*l.*, 420*l.*—By *C. V. Stevens*: 1 and 2, Drayton-villas and a plot of land, Leytonstone, f., 1,250*l.*; No. 40, Waterloo-rd., u.t. 30½ yrs., g.r. 9*l.*, 500*l.*

SEPTEMBER 29.—By *Broad & Wiltshire*: The lease of 123, High-rd., Kilburn, u.t. 12 yrs., r. 150*l.*, 360*l.*; the lease of 45, Heath-st., Hampstead, u.t. 17 yrs., r. 120*l.*, 160*l.*; 20, Seven Sisters-rd., Holloway, the lease of, u.t. 6 yrs., r. 130*l.*, 1,200*l.*—By *A. Prevost & Son*: 222, High-st., Shadwell, f., r. 35*l.*, 580*l.*; 23, Britannia-st., Hoxton, f., 305*l.*; 13 to 19 and 33 to 59 (odd), Johnson-st., Commercial-rd., E., u.t. 13 yrs., g.r. 54*l.*, 1,500*l.*; 82, Jubilee-st., Mile End, u.t. 9 yrs., g.r. 3*l.*, 105*l.*; 13a, Harley-st., Bow, u.t. 10 yrs., no g.r., r. 30*l.*, 90*l.*—By *Eastman Bros.*: The f. residence, "Ravenswood," Anerley Pk., 2,000*l.*; the "Auckland Tavern," Gipsy-rd., Norwood, u.t. 75 yrs., g.r. 20*l.*, 11*l.* 10s.—By *Jenkins & Sons*: 5, Bampton-rd., Forest Hill, u.t. 75 yrs., g.r. 5*l.*, 350*l.*; 2, Morden-hill, Greenwich, u.t. 70 yrs., g.r. 5*l.*, r. 24*l.*, 265*l.*—By *A. Booth*: 124, Brecknock-rd., Camden-rd., u.t. 50 yrs., g.r. 8*l.*, 525*l.*—By *W. A. Blakemore*: "West Green Cottage," &c., Tottenham, u.t. 3 yrs., g.r. 2*l.* 10s., r. 19*l.*, 25*l.*

SEPTEMBER 30.—By *Baker & Sons*: 35 and 37, Hoxton-st., Hoxton, f., 1,725*l.*; 47 to 53 (odd), Falmouth-rd., Walworth, u.t. 6 yrs., g.r. 5*l.*, r. 132*l.*, 230*l.*; 3, 5, and 6, High-rd., Edenbridge, and eight cottages, f., 850*l.*; "Mead House," High-rd., and 7 a. 2 r. 30 p., f., 410*l.*; 15 and 17, Mayfield-rd., Dalston, u.t. 45 yrs., g.r. 8*l.*, r. 61*l.* 10s., 460*l.*; 57 to 65, Rendlesham-rd., Hackney, u.t. 77 yrs., g.r. 19*l.*, r. 140*l.*, 880*l.*; Nos. 284, 286, and 288, Southwark-pk.-rd., u.t. 64 yrs., g.r. 8*l.* 13s., r. 135*l.*, 970*l.*; f. range of stabling, Bourne-st., Croydon, r. 30*l.*, 325*l.*; freehold cottage, Felmersham, Beds., 45*l.*; 24, Standen-rd., Wandsworth, u.t. 88 yrs., g.r. 4*l.*, 95*l.*; two enclosures of land, 8a. 0 r. 2 p., f. and c., Alfriston, Sussex, 355*l.*—By *Harman Bros.*: 28 to 34 (even), and 59, 61, and 63, Swanscombe-rd., Turnham-green, u.t. 35 yrs., g.r. 70*l.*, 55*l.*

[*Contractions used in these lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g r. for ground-rent; r. for rent; f. for freehold; c. for copyhold: l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.

Greenheart, B.G. ton	9/0/0	0/0/0
Teak, M.I. load	9/10/0	15/0/0
Sequoia, U.S. ft.cu.	2/4	3/0
Ash, Canada load	2/10/0	4/0/0
Birch, do.	3/5/0	4/10/0
Elm, do.	3/10/0	4/15/0
Fir, Dantzic, &c.	1/10/0	3/10/0
Oak, do.	3/0/0	5/5/0
Canada	5/10/0	7/0/0
Pine, Canada red	2/10/0	3/10/0
Do, yellow	2/10/0	3/0/0
Lath, D'antzic, fath	3/0/0	6/0/0
St. Petersburg	3/0 0	7/0 0
Deals, Finland		
2nd & 1st std 100	7/10/0	9/10/0
Do, 4th & 3rd	7/0/0	8/0/0
Do. Riga	6/10/0	8/0/0
St. Petersburg, 1st yellow	10/10/0	14/10/0
Do. 2nd yellow	8/0/0	9/10/0
Do. white	7/0/0	9/10/0
Swedish	7/0/0	16/0/0
White Sea	8/0/0	17/0/0
Canada, Pine 1st	20/0/0	26/10/0
Do. do. 2nd	14/10/0	16/0/0
Do. do. 3rd, &c.	7/10/0	10/0/0
Do. Spruce. 1st	8/10/0	11/0/0
Do. do. 3rd & 2nd	6/5/0	8/0/0
New Brunswick	6/10/0	7/0/0
Battens, all kinds	9/10/0	15/10 0
Flooring Boards, sq., 1 in. prep. 1st	0/3/0	0/13/0
Do. 2nd	0/7/0	0/10/0
Other qualities	0/3/0	0/7/6
Cedar, Cuba ..ft.	/3½	/4½
Honduras, &c.	/3½	/4
Mahogany, Cuba. St. Domingo, cargo av	/4½	/6½
	/4	2/0
Mexican do. do	/4	/5
Tobasco do. do	/5½	/7
Honduras do..	/5½	/6½
Box, Turkey ton	4/0/0	13/0/0
Rose, Rio	10/0/0	20/0/0
Bahia	9 0/0	18/0/0
Satin, St. Domingo ..ft.	0/0/7	0/1/8
Porto Rico	0/0/7	0/1/6

TIMBER (*continued*).

Walnut, Italian	0 0/3½	0/0/7

METALS.

IRON—Pig, in Scotland ton	2/2/1	0/0/0
Bar, Welsh, in London	5/17/6	6/0/0
Do. do. at works in Wales	5/7/6	5/10/0
Do. Staffordshire, in London	6/5/0	6/15/0
COPPER—British, cake and ingot	47/15/0	48/5/6
Best selected	49/0/0	49/10/0
Sheets, strong	56/0/0	0/0/0
Chili, bars	44/15/0	45/2/6
YELLOW METAL lb.	0/0/4½	0/0/5½
LEAD—Pig, Spanish ton	10/10/0	10/11/3
English, com. brands	10/12/6	10/17/6
Sheet, English, 3 lbs. per sq. ft. and upwards	12/5/0	0/0.0
Pipe	12/15/0	0/0/0
ZINC—English sheet ton	22/10/0	0/0/0
Vieille Montagne	23/0/0	0 0/0
TIN—Straits	93/2/6	93/12/6
Australian	93/12/6	94/2/6
English Ingots	95/0 0	95/5 0
Banca	93/10/0	0/0/0
Billiton	94/0/0	0/0/0

OILS.

Linseed ton	18/2/6	18/7/6
Cocoanut, Cochin	24/10/0	0/0/0
Do. Ceylon	21/10/0	0'0/0
Palm, Lagos	24/0/0	0/0/0
Rapeseed, English pale	23/10/0	24/0/0
Do. brown	21/15/0	22/0/0
Cottonseed ref.	18/0/0	0/0/0
Oleine	20/10/0	21/0/0
Lubricating, U.S.	4/0/0	5/0/0
Do. refined	5/10/0	12/0/0
TAR—Stockholm barrel	0/19/0	0/0/0
Archangel	0/12/6	0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 12 *noon on Thursdays.*]

ALTON (Hants).—Accepted for the erection of house for Mr. Bone, Grove-road, Alton:—
Edward Buckingham & Son, Winchester £235 0 0

BIGGLESWADE.—For making alterations and additions, and constructing a furnace chimney-shaft at the Union Workhouse, Biggleswade. Mr. E. Twelvetrees, architect, Sandy:—

Redhouse	£1,114	0 0	Ruffell £975 0 0
Wilmott	1,190	18 6	French & Ellwood, Sandy (accepted) 967 0 0
Coleman	998	0 0	

CARDIFF.—For erecting and completing a mansion at St. Mellon's, near Cardiff, for Mr. H. B. Cory. Mr. E. A. Lansdowne, architect, Newport (Mon.):—

W. Church	£13,218		Jno. Linton £11,900
Shepton & Son	12,800		Stephens, Bastow, & Co. . 11,899
Geo. Wilkins	12,500		Jno. Jenkins 11,193
W. Blackburn	12.389		Chas. Locke 11,145
H. A. Forse	11,968		E. T. Hatherley 10,987

CHEPSTOW.—For the construction of the sewerage of the town, for the Local Board. Mr. Atkins, Surveyor, Local Board Offices, Chepstow:—

T. Rees	£5,751	10 6	J. Strachan £4,065 13 6
T. Evans	5,150	0 0	Lloyd & Powell..... 4,060 18 5
Johnson Bros.	4,717	0 0	T. J. Davies 4,020 11 1
T. Goldsworthy	4,591	14 3	G. Rutter 3,932 4 6
H. Hill	4,487	0 0	Baker & Gregory.... 3,583 19 8
G. Law	4,328	16 8	C. W. Whalley, Chepstow (accepted) 3,574 16 3
W. R. Geen	4,303	11 0	
J. Welsh	4,187	12 1	J. Linton 3,304 0 0

FOXTON (near Market Harborough).—For repairs to the walls, roof, and floor of chancel of St. Andrew's Church, Foxton, including new chancel seats, altar rail, &c. Mr. H. Hardwicke Langston, architect, 9, Great James-street, Bedford-row, London. Quantities not supplied:—

H. H. Sherwin	£398		C. Down, Croydon* £305
T. Hill	328		* Accepted.

GREAT YARMOUTH.—For additions to Cobholm Island School, for the Great Yarmouth School Board. Messrs. Bottle & Olley, architects. Quantities by the architects:—

F. W. Bray	£428	0 0	F. Grimble £374 0 0
M. Barnard	415	17 6	J. Moore 369 0 0
R. Eastoe	376	18 0	J. S. Cooper 362 17 0
G. W. Beech	374	0 0	J. Leggett* 352 0 0
			* Accepted.

GREAT YARMOUTH.—For additions to Runham Vauxhall School, for the Great Yarmouth School Board. Messrs. Bottle & Olley, architects. Quantities by the architects:—

R. Eastoe	£445	8	G. W. Beech £410
W. Bray	444	0	J. Moore 405
F. Grimble	418	9	J. Leggett 399
J. S. Cooper	412	0	

HIGH WYCOMBE.—For the erection of new chair manufacturing premises at High Wycombe, for Messrs. J. Cox & Son. Mr. Thomas Thurlow, architect, High Wycombe:—

C. H. Hunt	£2,640	0	H. Harris £1,936 0
H. Flint	2,277	0	Nash & Sons 1,928 10
W. R. Loosley, Son & Pearce	2,023	0	G. H. Gibson (accepted) 1,904 0

HIGH WYCOMBE.—For the re-erection of "The Corporation Arms," for Messrs. Wheeler & Co. Mr. Thos. Thurlow, architect, High Wycombe:—
Chas H. Hunt (accepted) £1,293 15 0

HIGH WYCOMBE.—For the erection of bakehouse, business premises, residence, &c., for Mr. Benjamin Channer. Mr. Thos, Thurlow, architect, High Wycombe:—
W. R. Loosley (accepted) £1,249 0 0
For Baker's Oven.
J. Kirkby (accepted) £110 0 0

HIGH WYCOMBE.—For alterations to business premises, for Mr. H. Harvey. Mr. Thos. Thurlow, architect, High Wycombe:—

H. Flint	£315	0	W. R. Loosley £275 14
C. H. Hunt	294	0	J. T. Harris* 264 0
G. H. Gibson	288	0	* Accepted.

LEEDS.—For the erection of a warehouse, offices, &c., Willow-terrace-road, for Messrs. Burgon & Co. Mr. T. Butler Wilson, architect, Leeds:—

Mason and Brickwork—Paul Rhodes	£956	0	0
Joiners—Wm. Mason & Son	475	0	0
Slater—Wm. Atkinson	41	18	0
Plumbers—W. & C. Barrand	60	0	0
Plasterer and Concreter—Thos. Moore	109	0	0
Painter—George Thompson	17	0	0
Total	£1,658	18	0

[All of Leeds.]

LICHFIELD.—For building a new dining-hall, kitchen, laundry, and other works to the Workhouse, Lichfield. Mr. W. H. Woodroffe, architect, London:—

J. Harley & Son	£3,525		S. Lowe & Son, Burton-on-Trent (accepted) £3,287
Geo. Hodges	3,520		W. Walkerdine (withdrawn) 2,860
A. F. Whittome	3,498		
J. Parnell & Son	3,478		
J. Varlow	3,472		

LONDON.—For the erection of a new theatre for the Brixton Theatre Company, Limited. Messrs. Crewe & Sprague, architects, Fitzalan House, Arundel-street, Strand, W.C. Quantities by Messrs. Brunsden & Henderson, 47, Pall Mall, S.W.:—

G. Veale & Co.	£14,800		Allen & Sons £13,465
Jarvis & Sons	14,777		Colls & Sons 13,415
Newman's, Limited	13,900		Young & Lonsdale..... 12,977
A. Bush & Sons	13,870		Kirk & Randall 12,720
Martin, Wells, & Co.	13,700		

[Architects' estimate, £12,500.]

LONDON.—For the erection of the "Roebuck" Hotel, Chiswick, for Mr. Ford. Messrs. Gardiner, Son, & Theobald, surveyors:—

Plumbridge & Thomas	£7,218		Ansell £6,280
Patman & Fotheringham	6,738		Allen & Sons 6,239
Bush & Son	6,597		J. Bryant 6,141
Lansdown & Co.	6,495		W. Downs 6,138
Adamson & Sons	6,414		

LONDON.—For alterations to restaurant, confectioner's shop, bakehouse, &c., 230, Upper-street, Islington, for Messrs. Galloway & Son. Mr. Ernest H. Abbott, architect, 6, Warwick-court, High Holborn, W.C. Quantities by Mr. A. Johnson, 50, Imperial-buildings, Ludgate-circus, E.C.:—

Godden	£2,952		Drew & Cadman £2,455
Shurmer	2,736		Hall, Beddall, & Co. 2,430
Wontner, Smith, & Son	2,684		J. Anley 2,372
Bywaters	2,560		

LONDON.—For alterations and additions to 1a, Sidney-street, Goswell-road, for Mr. Evans. Mr. E. J. Harrison, architect, 70 & 72, Chancery-lane:—

Lilley & Lilley	£398		Ward & Lamble £327
Burton	361		Holrook 325
E. Houghton & Son	337		

LONDON.—For alterations at the "Prince Imperial" public-house, and building new house and shop adjoining, at Rotherhithe New-road, S.E. Mr. H. Robert, architect, 113, Lewisham-road. Quantities not supplied:—

Lascelles & Co.	£1,555		Todd £1,393
Rodwell	1,535		Walker 889
Drew & Cadman	1,459		

LONDON.—Accepted for building offices and warerooms, No. 24, Lawrence-lane, City, for Mr. H. P. Edwards. Quantities by Messrs. Ruault & Young. Mr. Herbert Knight, architect, 129, Cheapside:—
H. Bailey £3,379 0 0

LONDON.—For alterations and repairs to offices, 60, New Broad-street, City. Mr. H. Riches, architect, 3, Crooked-lane, King William-street, E.C.:—

C. H. Boyd	£138	10	Osborn & Sons (accepted) £129 0

LONDON.—Accepted for the erection of a detached residence, Stanhope-road, Crouch End, N. Mr. Alfred Conder, architect, Palace-chambers, 9, Bridge-street, Westminster:—
J. Chapman £1,450 0 0

LONDON.—For distempering, &c., at St. Leonard's Infirmary, Shoreditch, for the St. Leonard's Board of Guardians. Mr. Fras. J. Smith, architect, 7a, Great George-street, Westminster:—

White	£261	0 0	Gavin £187 10 0
Bragg	229	17 6	Akers 179 0 0
Batchelor	194	0 0	Ivory* 118 10 0
Derby	194	0 0	W. & E. Mills 115 0 0
			* Accepted.

LONDON.—For rebuilding the "North Pole" public-house, Wormwood Scrubbs, W., for Mr. T. H. Darby. Mr. J. Henry Richardson, architect, Shepherd's Bush. Quantities by Mr. Henry Lovegrove:—

Jones & Co.	£3,858		Scrivener & Co. £3,400
Tinckham	3,725		Lyford 3,266
Adamson & Son	3,549		Atherton & Latta* 3,104
Chamberlen Bros.	3,486		* Accepted.

LONDON.—For alterations and additions to 33 and 35, Queen's-road, Peckham, for Mr. Josiah Messent. Mr. J. C. Reynolds, architect, 30, Camberwell Green, S.E.:—

Ansell	£797		Smith £686
Young & Lonsdale	750		Parker 665
J. & H. Cox	735		Ditcham Bros. 569
Balaam Bros.	729		

LONDON.—For new choir-stalls at St. Peter's Church, Wickham-road, Brockley, S.E. Mr. John Jas. Downes, architect, 11, The Parade, Lewisham High-road, S.E.:—

J. Dorey & Co.	£403	0	W. H. Lorden & Son* £269 0
G. Hawes	298	10	* Accepted.

LONDON.—For alterations to the "Alma Tavern," Alma-street, Hoxton, for Mr. Ellidge. Mr. H. W. Punnett, architect:—

G. S. Archer	£598		Gibson £480
French	569		

LONDON.—For repairs and painting to lodges, greenhouses, &c., at the Cemetery, East Finchley, for the Islington Burial Board. Mr. F. H. Barfield, architect, 56, Lancaster-road, Stroud Green, N.:—

N. C. Torring, jun.	£250	0	Marchant & Hirst, High-gate-road* £139 10
Stevens Bros.	205	0	* Accepted.

LONDON.—Accepted for the warming and ventilating of St. Giles' Church, Cripplegate, London, E.C.:—
John Grundy, London £245 0 0

LONDON.—For the erection of a cottage, lodge, &c., at "Irish Corner," East Finchley, for the Islington Burial Board. Mr. F. H. Barfield, architect, 56, Lancaster-road, Stroud Green, N. :—

Marchant & Hirst	£358 0	Wheeler & Co.	£339 10
Stevens Bros.	357 0	Hy. Cooper	337 0
Chas. Plowman	355 0	E. Houghton & Son, Lancaster-road (accepted)	289 0
McFarlane Bros.	352 0		

LONDON.—For alterations and additions to "Fern Bank," Florence-road, Stroud Green, for Mr. G. W. Woodrow. Mr. F. H. Barfield, architect, 56, Lancaster-road, Stroud Green, N. :—

Paton Finlay	£126 8	Marchant & Hirst	£93 0
E. Houghton & Son	97 10	Stevens Bros. (accepted)	75 0

PLYMOUTH.—For alterations at the Conservative Club. Mr. Jas. H. Keats, architect, Plymouth. Quantities by the architect :—

R. Stanlake	£227 17	J. H. Blackell	£157 10
Lapthorn & Goad	181 5	W. Trevena, Plymouth *	130 0
A. W. Lethbridge	175 0		

* Accepted.

PLYMOUTH.—Accepted for alterations at the "Golden Lion" Hotel, for Mr. Jno. F. Selmon. Mr. Jas. H. Keats, architect, Plymouth. Quantities by the architect :—

T. May, Plymouth £254 0 0

PLYMPTON (Devon).—For roofing and other work at the Workhouse, for the Union Guardians. Mr. Jas. H. Keats, architect, Bedford-street, Plymouth. Quantities by the architect :—

A. R. Lethbridge & Son	£175 0	W. Rundle	£119 10
Lapthorn & Goad	147 10	Cottle & Truscott	113 18
W. Blake	142 0	R. Rogers	110 0
A. N. Coles	129 0	W. Jenkins, Park-street, Plymouth (accepted)	107 9
Corber & Foale	121 10		
A. Andrews	120 0		

SALE.—For the execution of certain road works and lighting, Roebuck-lane, for the Local Board. Mr. A. G. McBeath, Surveyor, 4, School-road, Sale :—

Matthew Naylor & Son	£222 4 5	William Barton, Hale *	£170 0 0
George Bozson	205 0 0		

* Accepted.

SHEFFIELD.—For the construction of new sewers in Brightmore-street, Sharrow Vale-road, Renton-street, Andrew-street, and Wicker-lane, Sheffield, from plans, specifications, &c., prepared by Mr. C. F. Wike, C.E., Borough Surveyor :—

James Dickson	£2,574 12 6	G. W. Naylor, Hud-dersfield *	£1,673 3 6
Townsend & Watson	2,152 3 6		
Dearden & Williamson	2,136 6 0		

* Accepted.

[Borough Surveyor's estimate, £2,124. 2s. 3d.]

WEST HAM.—For constructing the Forty Acre-lane sewer, for the Corporation of West Ham. Mr. Lewis Angell, Borough Engineer :—

Cooke & Co.	£1,027 0 0	J. Brightmore	£927 16 0
J. Neave	994 0 0	J. Jackson	817 0 0
W. Griffith	948 0 0	J. Burrill, East Ham *	794 6 2

* Accepted.

WEST HAM.—For fencing recreation-ground, South West Ham, for the Corporation of West Ham. Mr. Lewis Angell, Borough Engineer :—

Merrett & Franklin	£1,333 5 0	Beadle Bros.	£765 5 0
A. E. Wren	907 0 0	Longley & Sons	762 5 0
J. G. Horlock	879 6 0	M. Marshall	722 2 6
D. Barfoot	872 19 6	Mulford Bros.	706 3 0
Pye & Plummer	810 15 0	Astell Bros.	677 2 6
E. C. White	801 0 0	J. Jackson	670 0 0
Thos. Turner, Ltd.	792 0 0	Rowland Bros., Bletchley (accepted)	598 3 9

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C. F. W. (next week).—J. C. (they will be published if sent).—T. D. B.—H. E. H.

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

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Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

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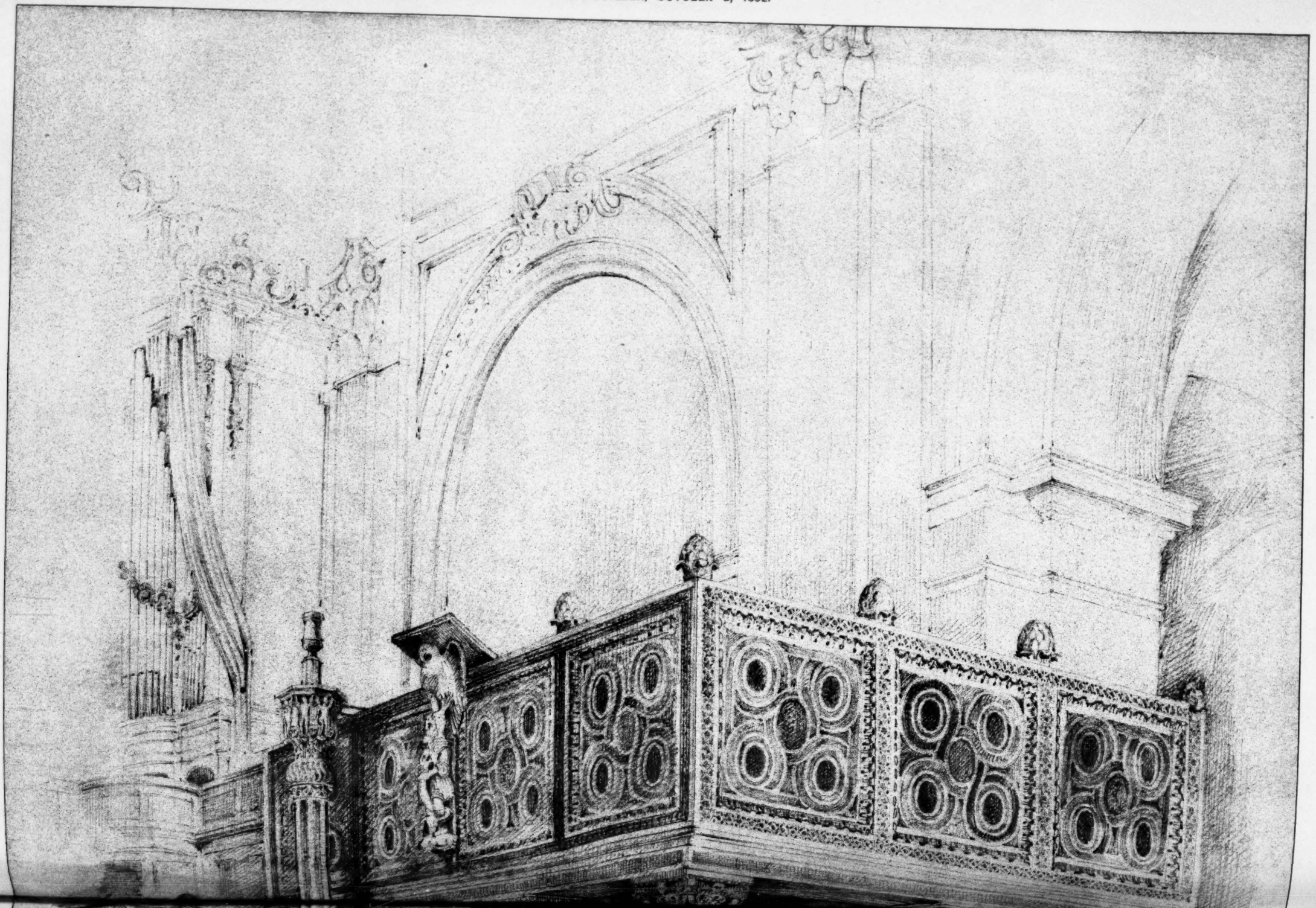

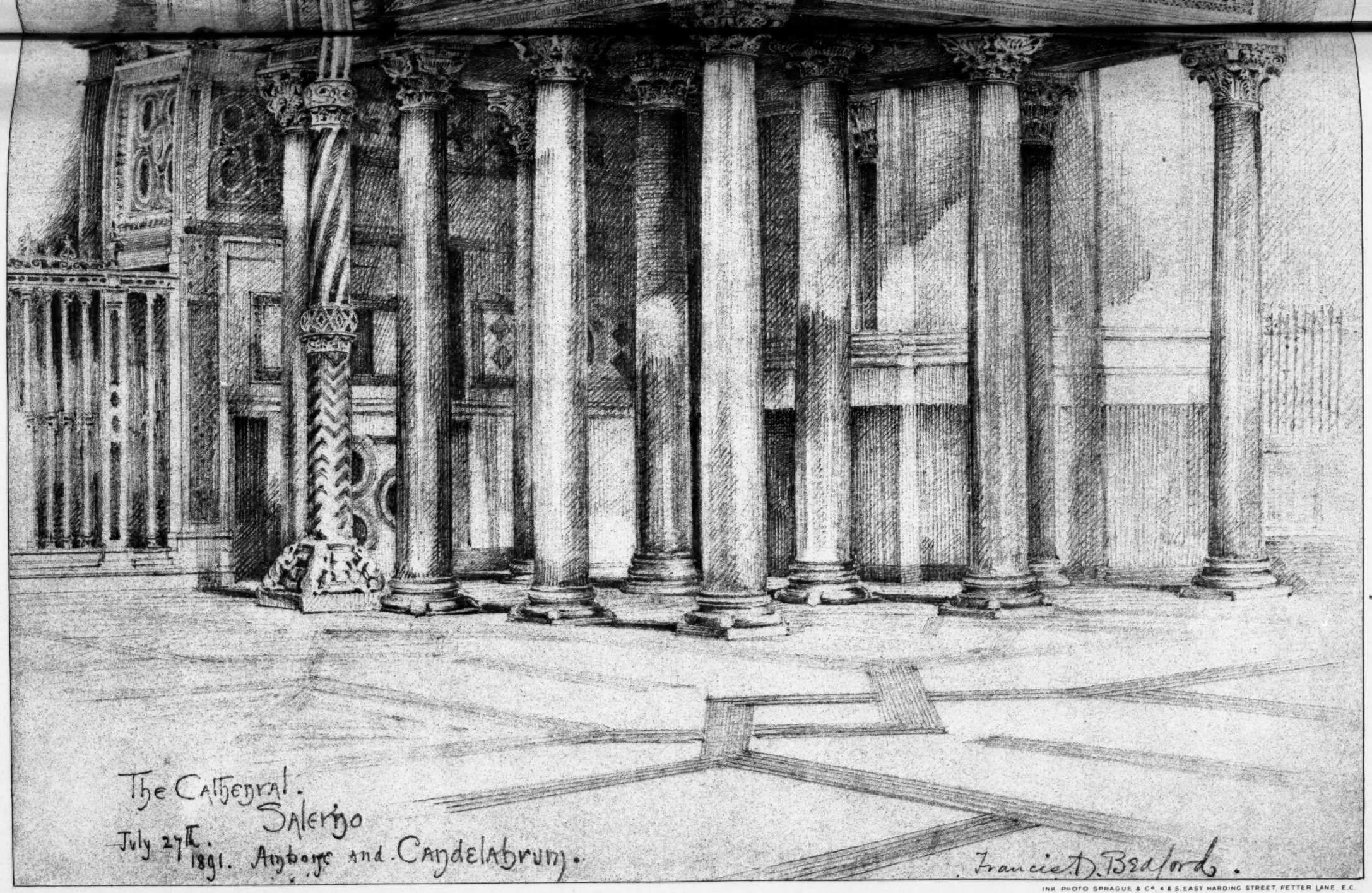

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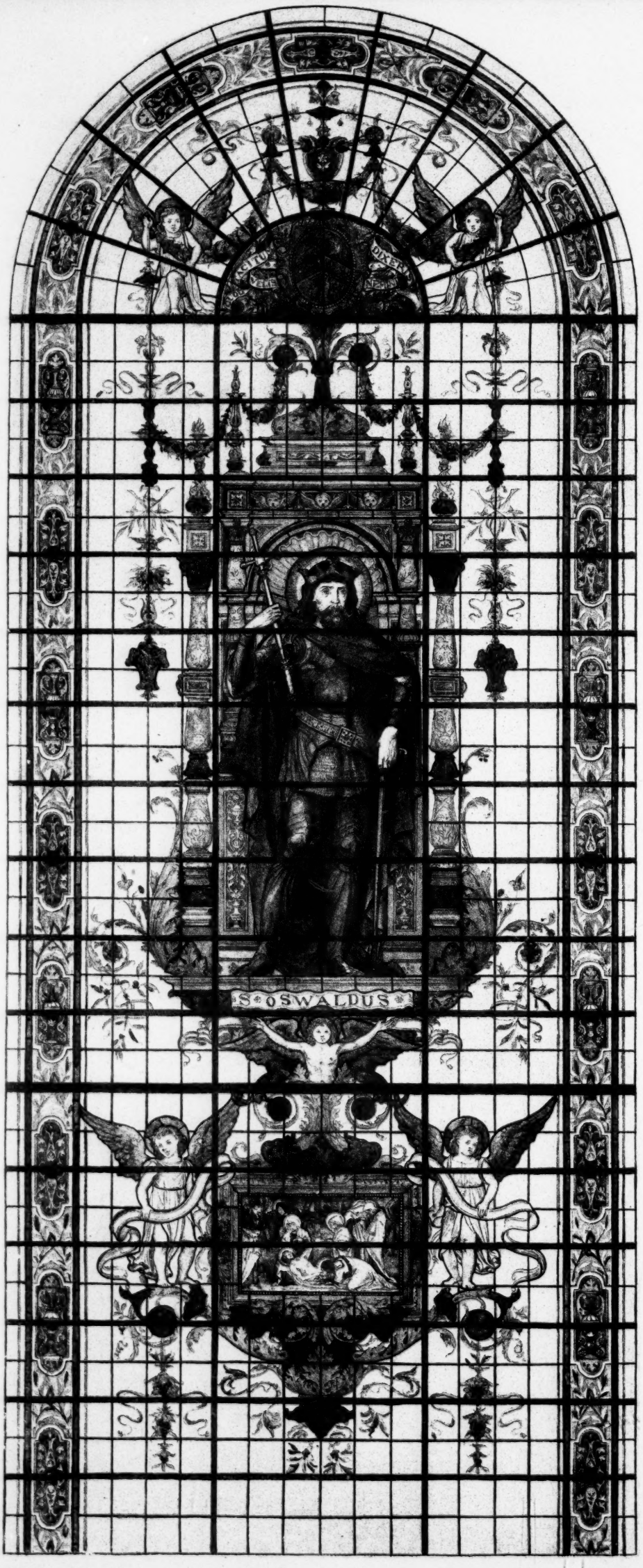
Royal Academy Exhibition, 1892.



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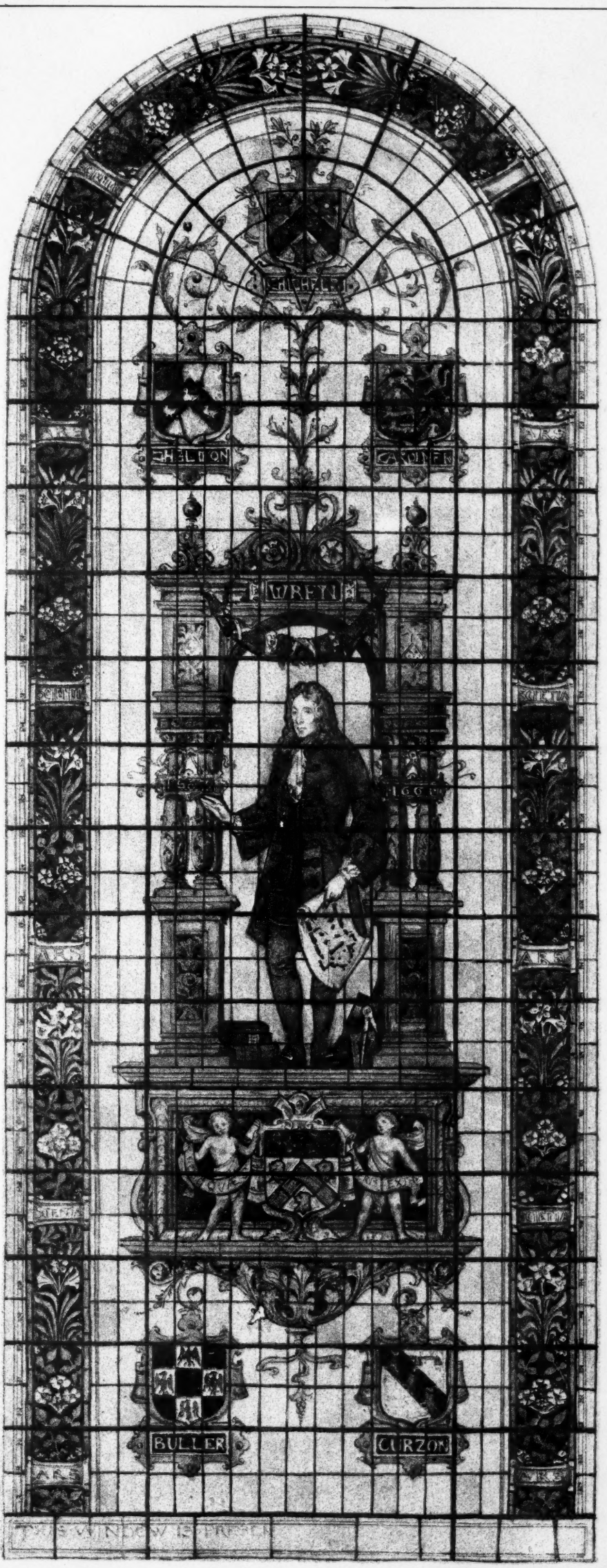
Royal Academy Exhibition, 1892.



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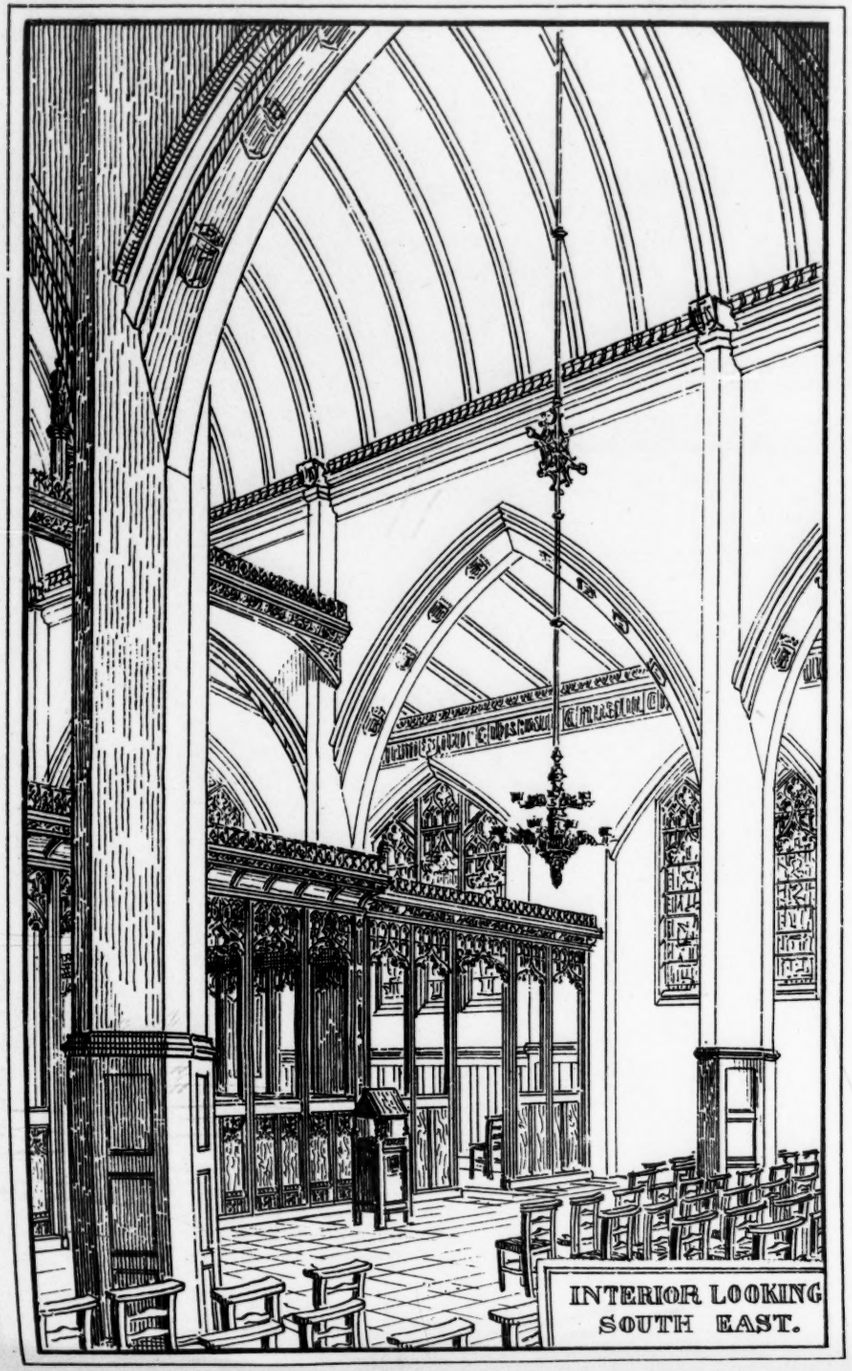

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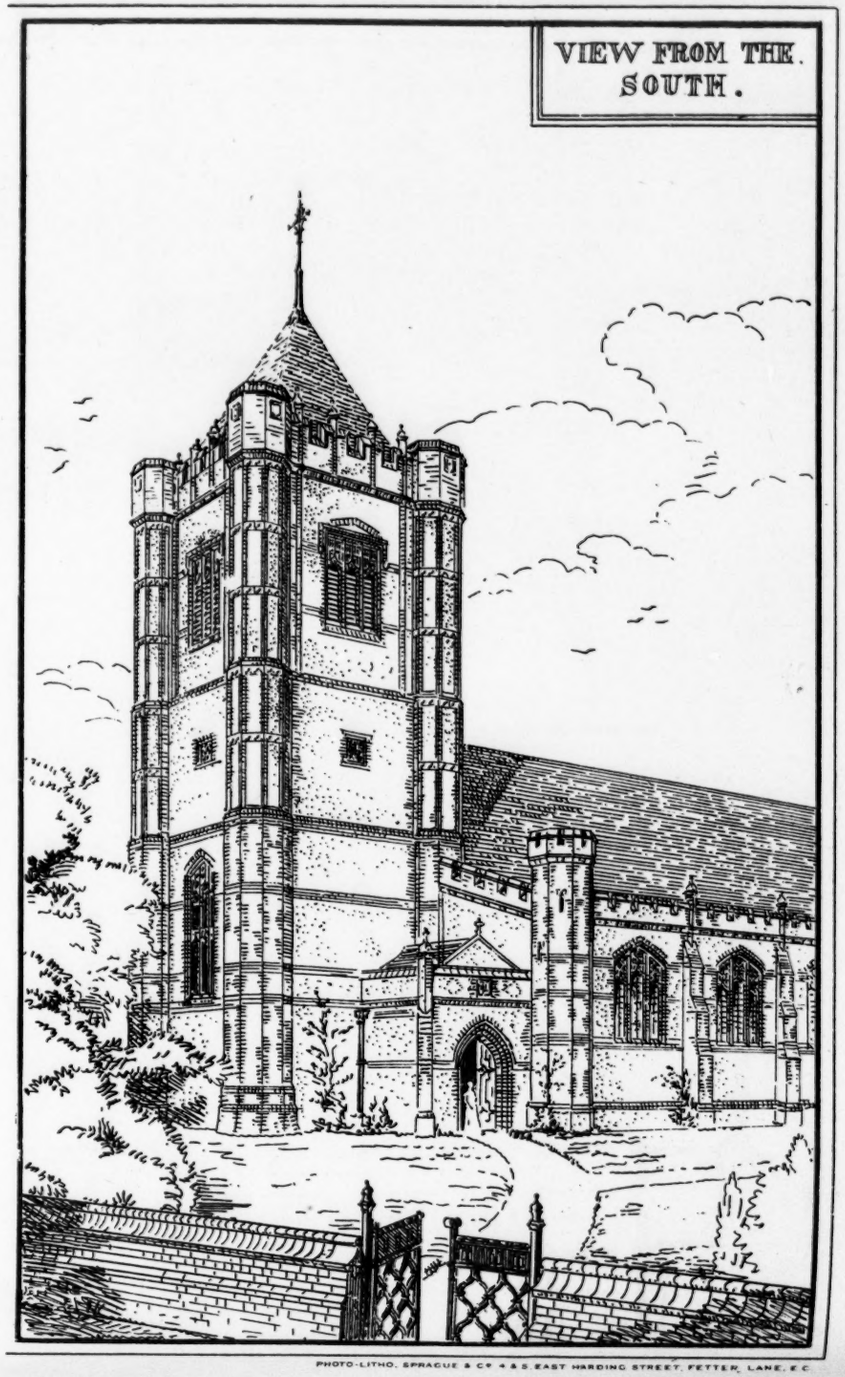
J.T. MICKLETHWAITE
ARCHITECTS.



VIEW FROM THE SOUTH.

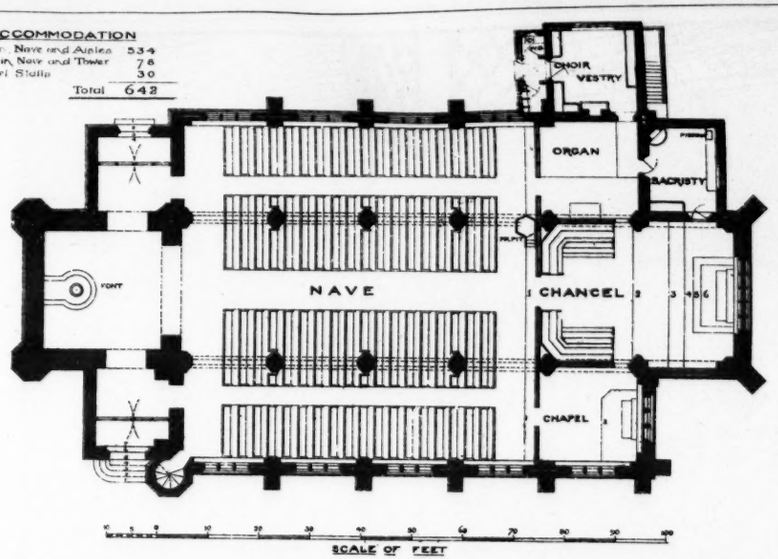
PHOTO-LITHO. SPRAGUE & Co 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.

PHOTO-LITHO. SPRAGUE & Co 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.

SOUTH ELEVATION.

ACCOMMODATION

Pews in Nave and Aisles	534
Chairs in Nave and Tower	78
Chancel Stalls	30
Total	642



SCALE OF FEET

10 5 0 10 20 30 40 50 60 70 80 90 100

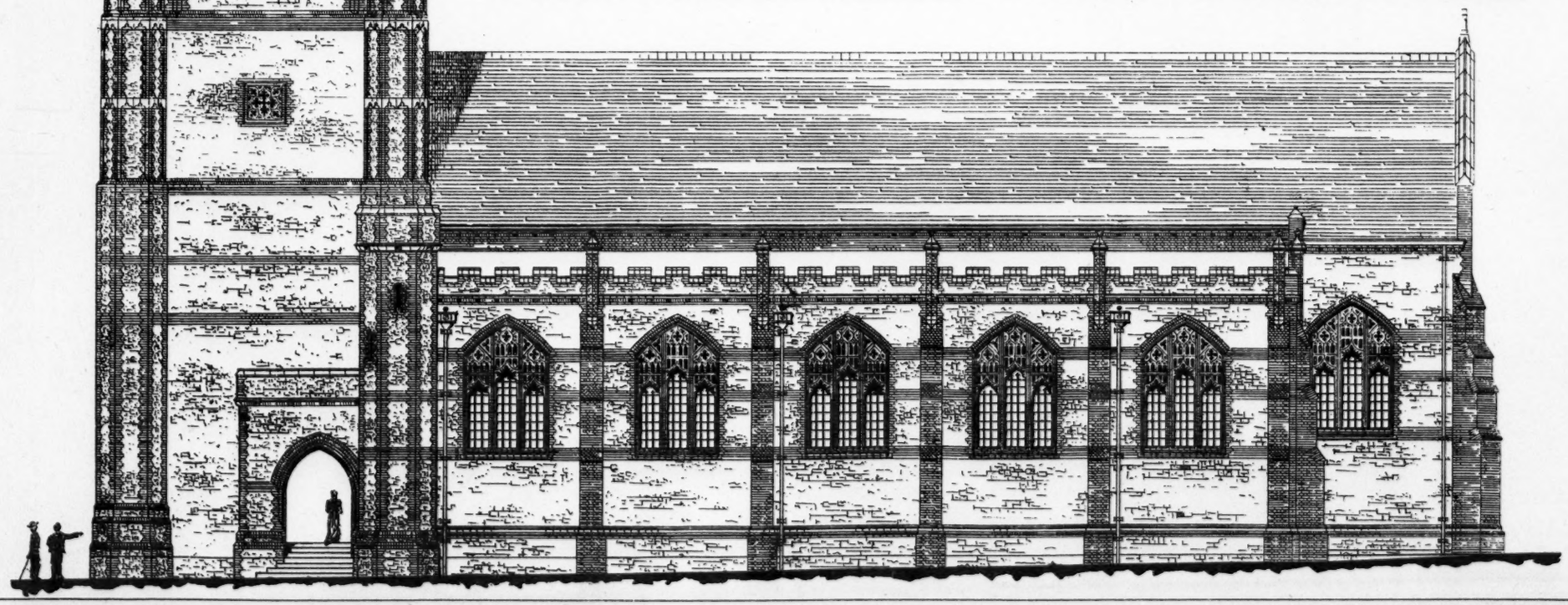
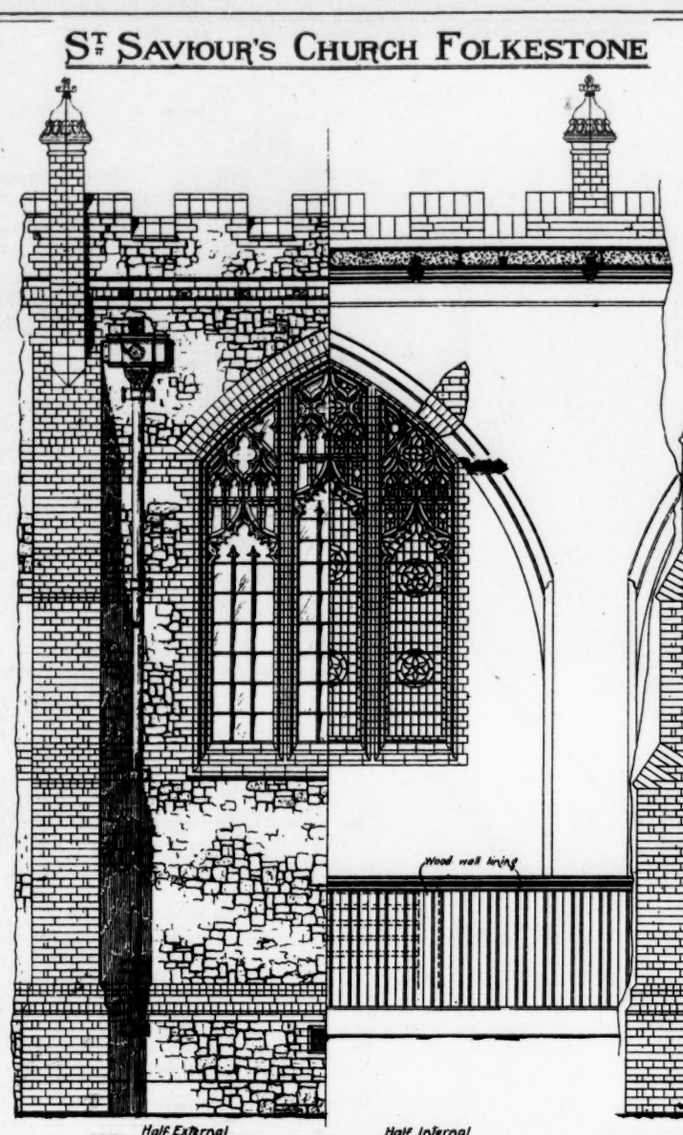
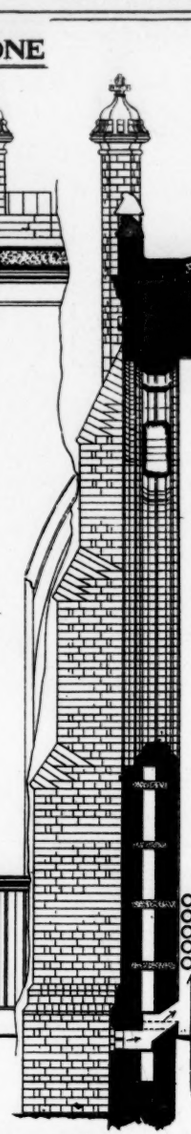


PHOTO-LITHO. SPRAGUE & Co 4 & 5, EAST HARDING STREET, FETTER, LANE, E.C.

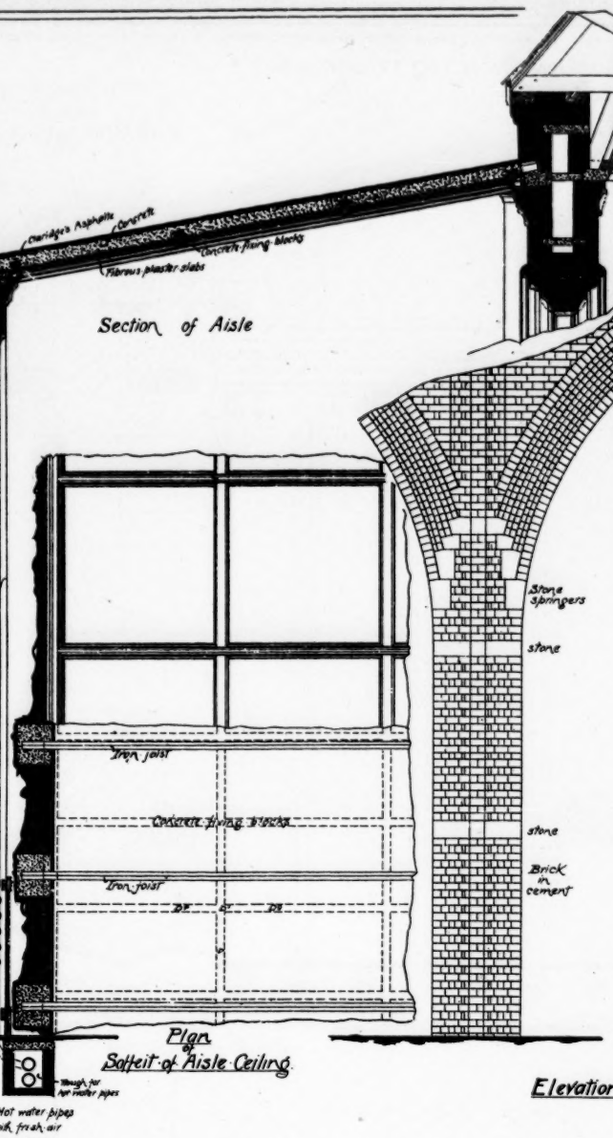
St Saviour's Church Folkestone



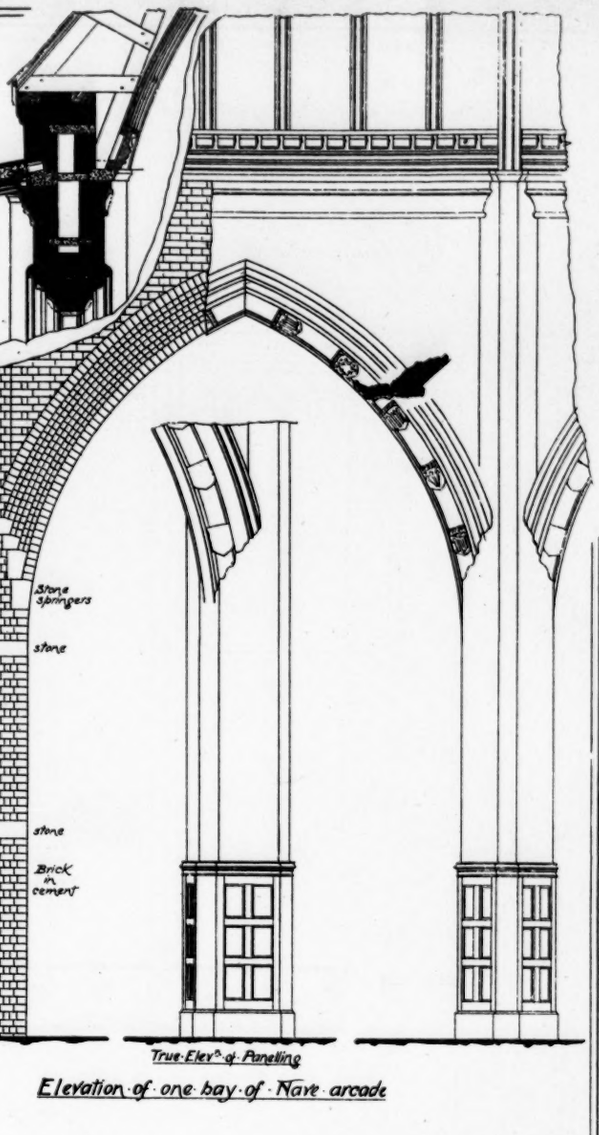
Half External Half Internal
Elevation of one bay of Aisle



Section

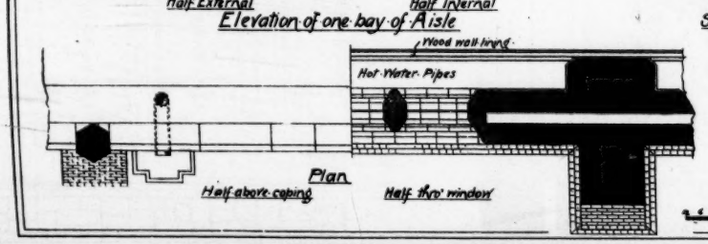


Plan of Soffeit of Aisle Ceiling



True Elevn of Panelling

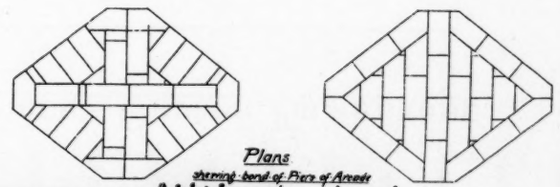
Elevation of one bay of Nave arcade



Plan
Half above coping Half thro' window

Somers Clarke
J.T. Micklethwaite } Architects

Scale of Feet



Plans
Shewing bond of Piers of Arcade
Scale of Feet for piers

PHOTO-LITHO. SPRAGUE & Co 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.

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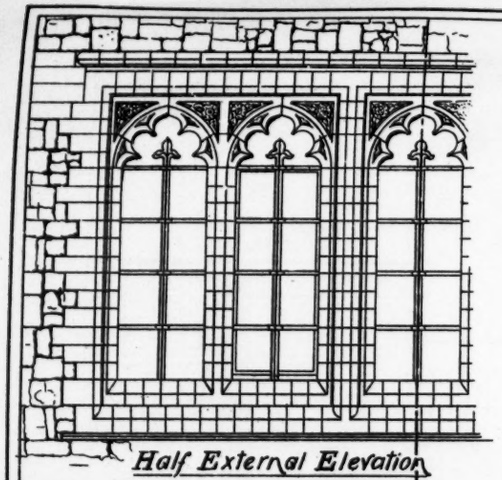
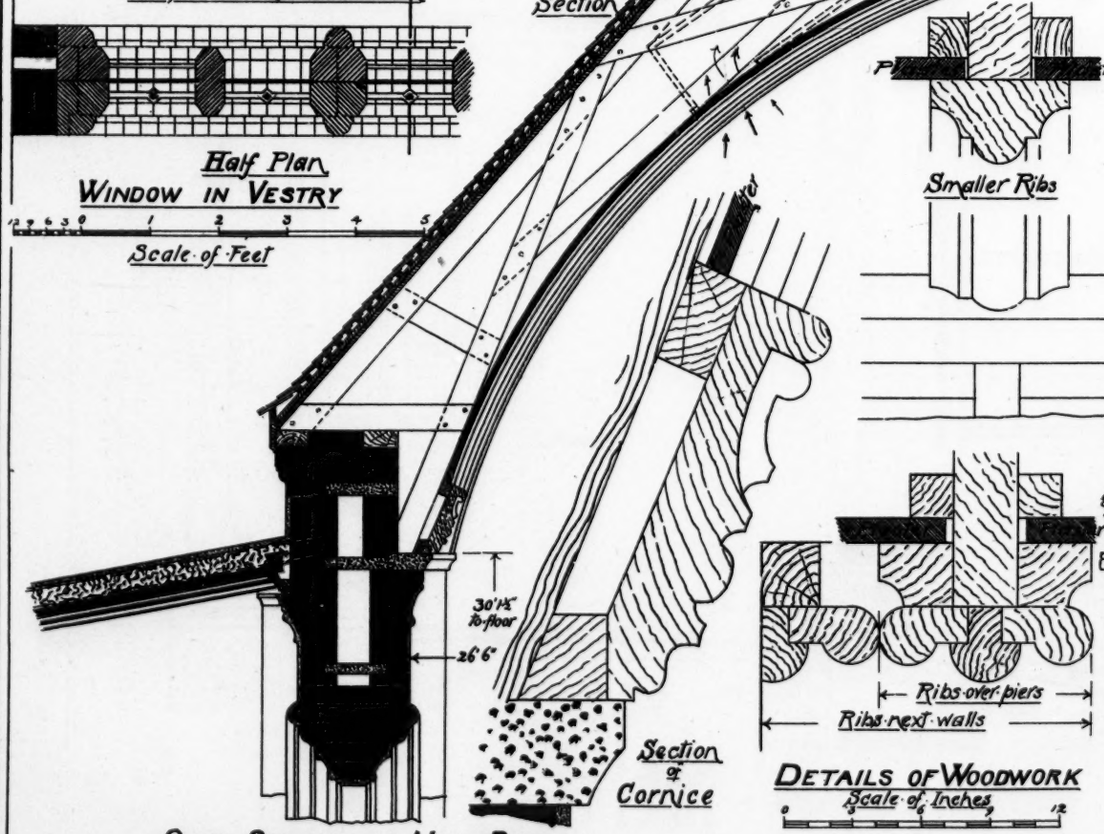
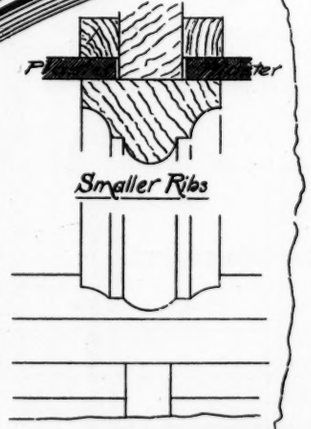
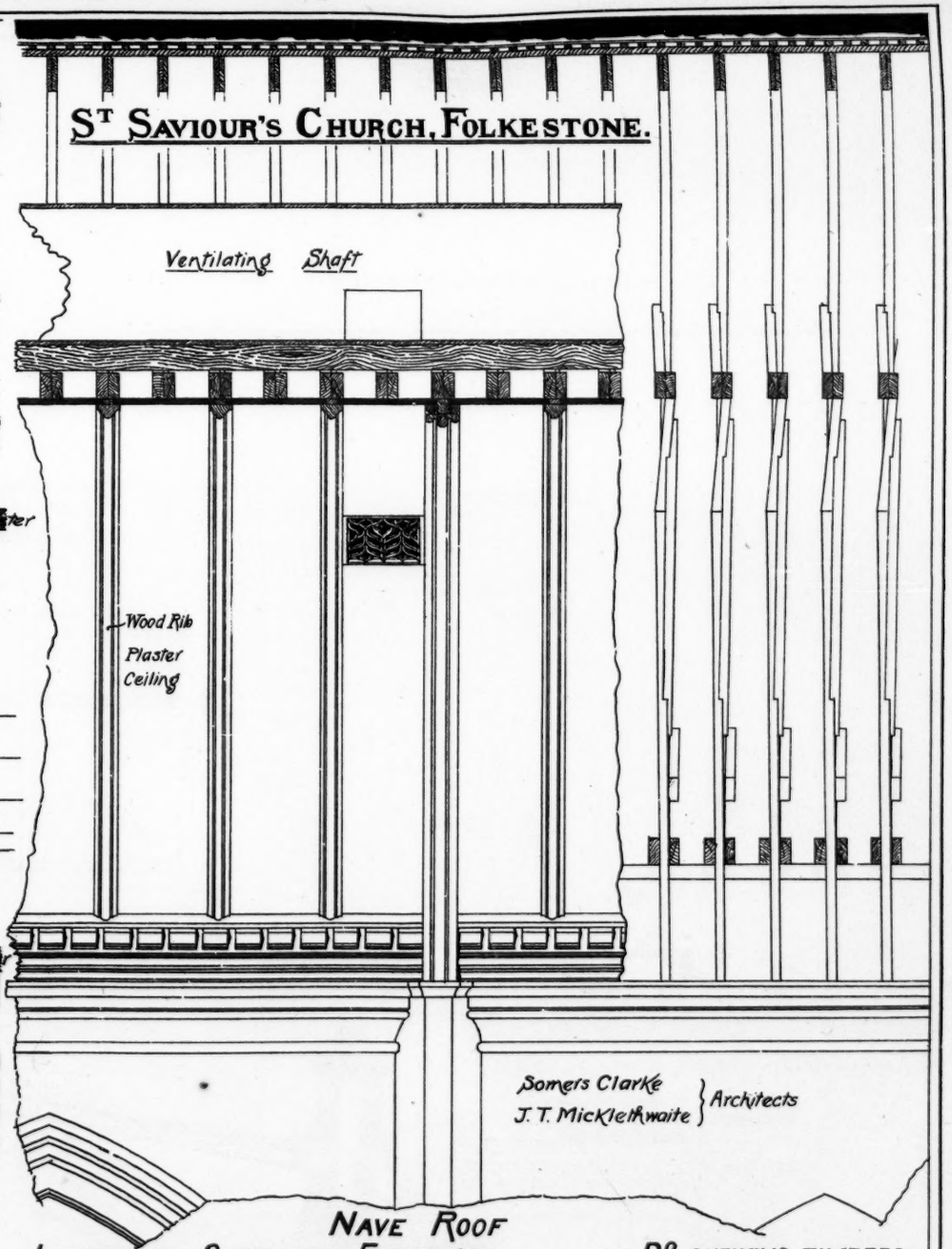
St Saviour's Church, Folkestone.









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